THE ELECTRICAL WORLD

A Weekly Review of Current Progress in Electricity and its Practical Applications

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The Electric Light in Photography.

The use of the electric light in photography as a substitute for sunlight, which will permit the photographer to ply his avocation successfully "rain or shine," day or night, is one of the most useful applications which have been realized.

The art of photography depends, as is well known, on the power which the rays of the sunlight possess, of causing chemical changes in a sensitive plate exposed in the focus of a camera obscura, whereby the different portions of the image become darkened to an extent proportional with the comparative amount of light reflected on them from the various parts of the object, thus producing shadows of every depth, which outline the object photographed and give relief to the resulting picture. This remarkable property of sunlight, called "actinism," is due to the presence of certain characteristic rays, called actinic, which occupy the upper or violet end of the spectrum and the space immediately beyond.

Although sunlight answers all the requirements of the art, yet its use is attended with much and sometimes serious inconvenience. The photographer is compelled to locate his studio on the topmost floor of the building, which is very inconvenient to his patrons. Moreover, the studio itself must be provided with a glass dome so constructed that the light will be admitted in a diffused state from all sides of it, and not from the top only. The importance of a diffused light cannot be overestimated, for it constitutes one of the main factors that contribute to the excellence of the artist's results. The great desideratum in photography is to delineate the objects and subjects reproduced by shadows blending with each other in insensible gradations. In photographing the human face for instance, the artist endeavors to avoid reproducing one side of the face in light shadows and the other in dark shadows that contrast too strongly with the light ones—a result which would be inevitable if the light shone more on one side of the face than on the other.

By far the greatest disadvantage which results from the necessity of depending exclusively on sunlight in photography, however, is its frequent periodic failure in consequence of atmospheric changes. The winter months constitute the most lucrative season of the photographer, and, unfortunately, it is just at this time that the supply of sunlight is most unsatisfactory, because the days are shorter, and the weather is more uncertain than during the summer months. In certain cities where the atmosphere is perpetually darkened by smoke or fogs, as London, for instance, photography becomes a matter of great difficulty, and the results, even on the more favorable days, are far from satisfactory.

These reasons have led many photographers to an extended search in the direction of a reliable and convenient substitute that could be depended upon under all circumstances. The light obtained from gas or from oil lamps and wax candles is unfit for the purpose, because it is deficient in the violet and especially the actinic rays which, as shown above, are the necessary ones for photographic purposes. In the whole category of artificial lights, only two have been found which possess the actinic rays in sufficient quantity to be adapted to the purpose, viz., the magnesium light and the light of the voltaic arc.

The magnesium light, which is produced by burning a fine wire of magnesium, is a bluish white light recalling strongly the arc light. Before the development of the art of electric lighting had placed the arc light within such easy and convenient reach the magnesium light was sometimes used in photography as a substitute for sunlight where the latter was not available, as in photographing dark interiors, caves, etc. These experiments were not very successful, however, because the pictures obtained presented strong contrasts of shadows owing to the lack of diffusion. Moreover the comparative expense of the magnesium light necessarily limited its use. The electric light is cheaper, more handy and convenient to use, and besides it possesses higher actinic power.

The first results obtained with the electric light showed the same lack of diffusion that characterized the magnesium light. To overcome this defect the number of lights used was increased, and they were placed at a distance apart so that their shadows would intercept each other. In other cases the light of the voltaic arc was diffused by reflection from parabolic reflectors. The use of reflectors, however, is not entirely satisfactory, and the photographs obtained in this way, by certain artists in London, Paris and Berlin, do not exhibit so well the roundness and relief of feature which are obtained with a thoroughly diffused light.

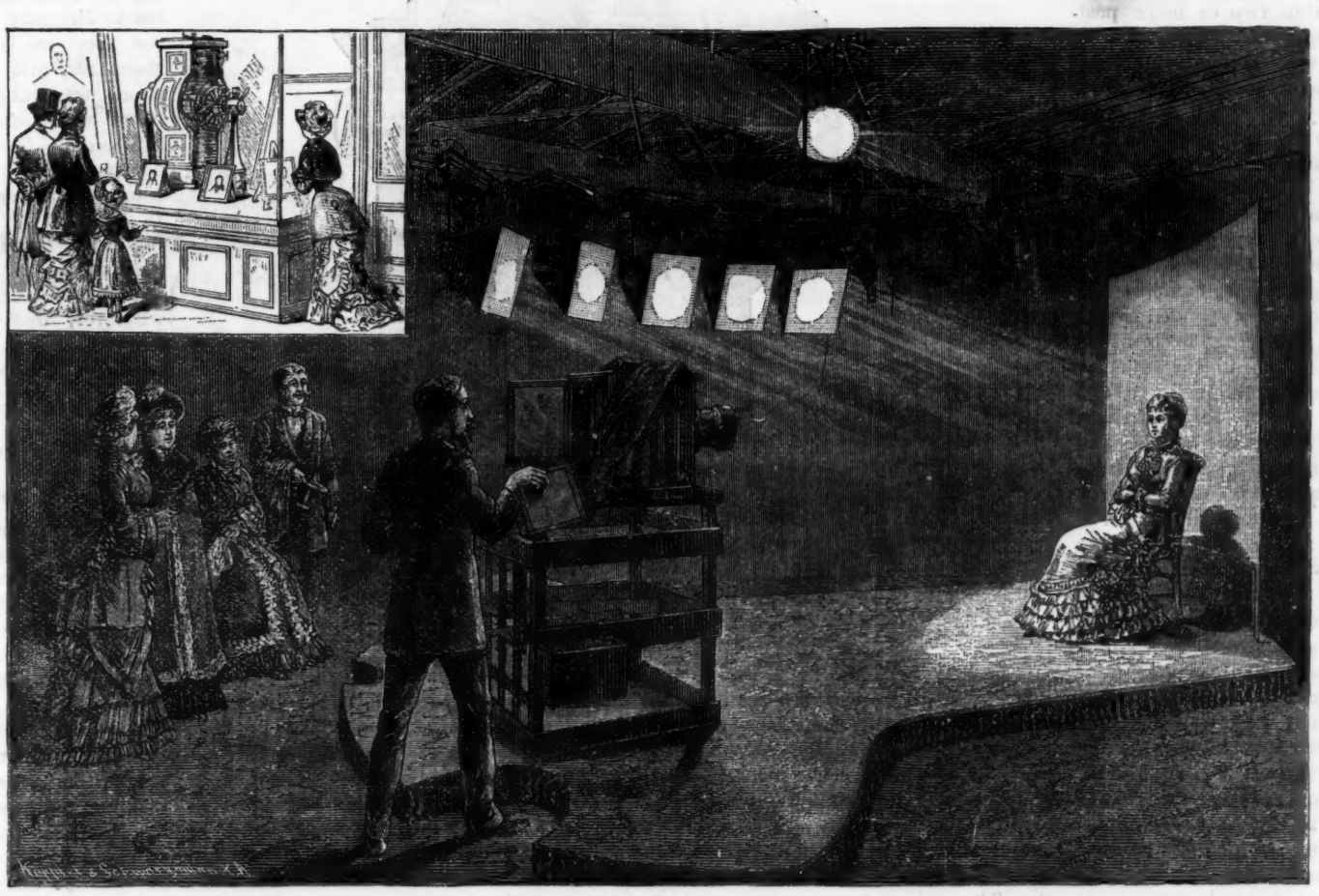

FIG. 1. THE KURTZ SYSTEM OF DIFFUSING THE ELECTRIC LIGHT IN PHOTOGRAPHY.

A well-known artist photographer of this city, Mr. William Kurtz, has at last solved the problem of diffusion in a most satisfactory manner. By the courtesy of Mr. Kurtz we have been allowed to visit his studio, at No. 233 Broadway, for the purpose of examining his system, and we are thus enabled to present our readers with some interesting details and illustrations on the subject. Mr. Kurtz endeavors to secure as thorough diffusion of the light as possible by multiplying the number of arc lamps, and providing each with globes of ground oropaline glass, or with lanterns of thin tissue paper. The lights may also be grouped in various ways relatively to each other. But not satisfied with this, Mr. Kurtz resorts to the expedient of placing both the sitter and the camera on a platform pivoted on a centre pin, and of rotating the platform during the operation of photographing so as to vary the angle at which

the light from each lamp strikes the sitter. In this way the light is made to strike each feature at every angle as it passes successively from a shady to a lighted position or vice versa, and thus an artificial diffusion is obtained which produces superior blending effects in the lights and shadows of the picture. Our front page illustration represents the interior of Mr. Kurtz's studio.

The camera occupies one end and the sitter the other end of the platform, which is raised above the floor and turns on its centre on a steel pin which is received in a vertical bearing in the centre of the floor. The frame of the platform consists of two cross beams superposed at the centre, and supporting two parallel beams extending lengthwise and upon which the flooring is laid transversely. This construction gives great solidity to the platform and diminishes the chances of vibration, whether lateral or longitudinal, by which the sitter and the camera might be disturbed relatively to each other, as the platform is rotated by the operator. This is important, for if the platform vibrated in this manner the image in the camera would be displaced to and fro to a slight extent, and the picture would be blurred and indistinct. A curved screen placed behind the sitter serves as a kind of concave reflector, which assists in diffusing the light from the lamps. The camera stand is supported on wheels, and it is movable on a small track (not shown in the engraving) from one side of the platform to the other in a circle whose centre is exactly at the point occupied by the sitter. This innovation will greatly interest photographers, and it reflects credit on the ingenuity of Mr. Kurtz. The utility of this arrangement is very great. It is customary, at least in this country, to take several views of each sitter, in different presentations, such as full face, right side, left side, etc., and let the sitter select from the proofs of the negatives that which is the most suitable. In every case it is necessary to refocus the camera with each change of position. But with this arrangement the camera remains in focus as it moves, and thus two or more positions may be photographed without trouble to the operator, who simply pushes the camera sidewise and exposes a fresh plate. The arrangement by which the operator is enabled to dispose the lamps at the convenient distance, and in the proper relation to the sitter, is most ingenious, and recalls the overhead railways found in machine shops where heavy pieces of machinery are to be moved from one machine to the other. The group is composed of six arc lights which are suspended from a transverse frame extending horizontally from one side of the room to the other at a little distance below the ceiling, and which constitutes a traveling carriage, provided with wheels or rollers and moving on wooden rails extending from one end of the studio to the other on each side and supported by wooden brackets.

The transverse frame itself carries a smaller carriage which moves from one side of the room to the other, and supports the screen-holder, consisting of a horizontal frame which rotates on a vertical pin projecting down from the smaller carriage. To this frame a flat screen is hung on couplings, so that it may be disposed at any angle, from the vertical to the horizontal. The larger or main traveling carriage supports three of the six arc lamps, and the screen-holding frame supports the remaining three. It will be seen that in this way the lights are in reality divided into two groups which can be moved together or singly. Thus, when the transverse frame is moved the whole system moves, but when the smaller carriage is moved from side to side, only three lights are moved, thereby establishing a new relative position between the two groups, which may be varied still further by swinging the screen-holder which supports them. Not satisfied, however, with the facilities for varied diffusive effects which this arrangement affords, Mr. Kurtz has provided each lamp with its own small traveling carriage, so that the lights of each group may be moved from side to side as occasion requires. Our engraving shows the six lights in a line with each other, but in practice it is found preferable to place them in different situations, so that each may emit its light at a different angle relatively to the sitter. Besides these six lamps there is also a single powerful light which is suspended from a second special transverse frame, moving on the wooden rails above referred to.

Mr. Kurtz has adopted the electric lighting system of the Excelsior Electric Company of this city, for this installation and commends its operation in very laudatory terms. As we propose to recur especially to this system in a future issue, we shall confine ourselves to a brief notice of the apparatus used in the above installation. The plan comprises two "Hochhausen" dynamo-electric machines, one adapted to supply six lights in series (Fig. 2) and another small single light machine (Fig. 3). The Hochhausen dynamo, so called after its inventor, the electrician of the Excelsior Electric Company, is peculiar in construction. It is of the general Gramme type, though it presents important and characteristic modifications. The magnetic field is constructed with a view to a better utilization of the magnetizing power of the current than in the majority of dynamo-electric machines so as to obtain the maximum effect from the least wire. The armature is in the form of a widened Gramme ring, wound with sixteen sections connected together and to the commutator as in the Gramme machine. Each brushholder carries two brushes, one a little in advance of the other, the object being to short-circuit each section of the armature as it passes the neutral point of the magnetic field.

The six-light machine is placed in the show window of Mr. Kurtz's establishment, and by its neat, handsome design serves to attract the attention of the throngs which are constantly passing by on Broadway. The power is obtained from a six-horse Westinghouse engine in the basement, the steam being taken from the mains of the New York Steam Heating Company. The current is conveyed by wires to the studio in the rear. The wires leading to the six arc lights fastened to the wall, one on each side near the ceiling, are flexible and are wound on reels to a length sufficient so that the transverse beam may be moved as far back as desired. When the transverse beam is moved back the sag of the wire is taken up by the reel which winds back under the influence of a weight

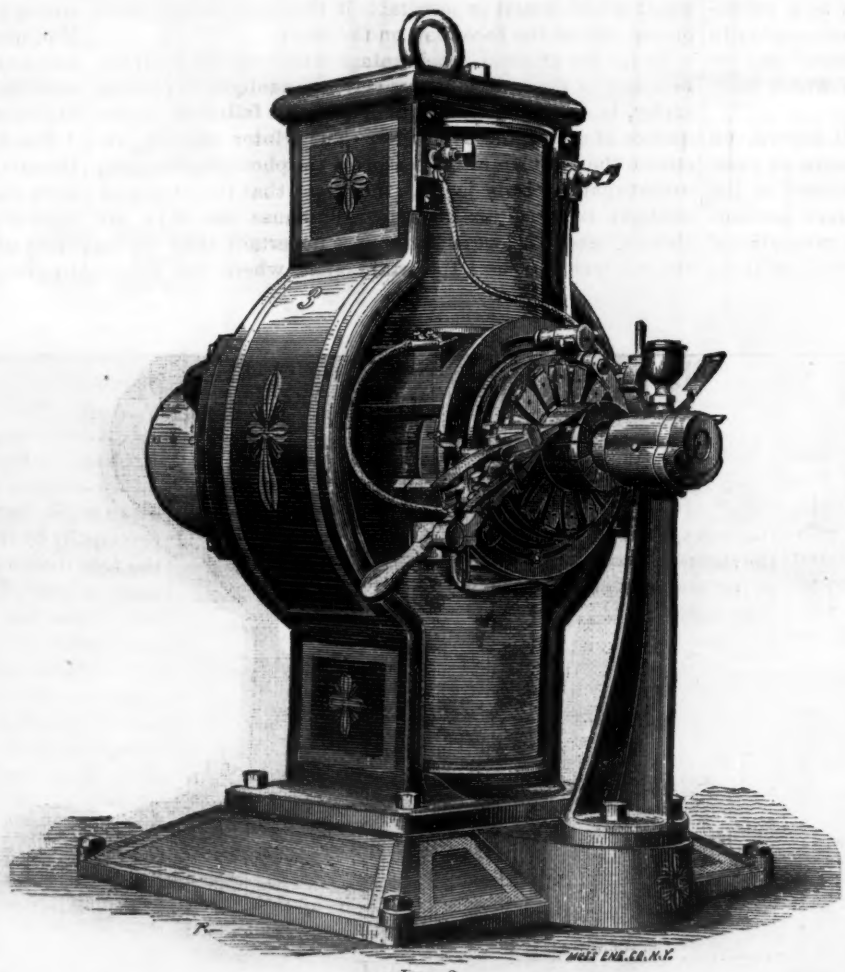

FIG. 2.

attached to a cord wound on a drum moving with the reel. The lamps are of a special design (Fig. 4) adapted to low ceilings. These lamps maintain their arc constantly at the same focus. The frame which supports the lower carbon moves upward as the upper carbon descends, supported by a small chain wound on a drum of the escapement mechanism, which is extremely simple. It consists of a train of clockwork constituting the escapement held by a horizontal lever fulcrumed about midway and attracted at each end by an electro-magnet, one of which is in the main circuit and the other in the derived circuit around the arc. When current is passed through the lamps the main current magnet causes the lever to tilt slightly, and the escapement is locked and the carbons are moved apart. As the carbons consume, the shunt magnet causes the lever to tilt the other way until the escapement is liberated, and thus the carbons are fed in the manner common to differential arc lamps. The upper carbon passes through a round opening which is the termination of the two vertical rods guiding the carbon holder, and which serves to keep the end of the upper carbon absolutely in line with the lower carbon.

Besides these lamps Mr. Kurtz also makes use of projectors or focusing lamps, shown in Fig. 5. These lamps, which are used with the single-light machine, are provided with parabolic reflectors and are of special use where it is desirable to direct a beam of intense light on a given surface, as in photo-engraving, a photographic industry to which Mr. Kurtz is giving considerable attention of late.

As the installation would not have been complete without a street light, one of the street lamps of the Excelsior Electric Company, suspended above the entrance, is supplied with current from the circuit now and then, and shines forth beamingly as if to defy the sun, and announce the fact to the public that "Old Sol" can be dispensed with. This lamp (Fig. 6) is remarkable for its neat and finished appearance. The case is bronzed and the vertical rods extending down to the lower carbon holder are enameled in white. These rods are close together, and come down inside of the globe, which is fastened to the lower carbon holder by an ingenious yet simple device.

The substitution of the electric light not only enables the artist to locate his studio on the ground floor or wheresoever the convenience of his patrons directs, but it opens to him a new source of revenue. During the winter months, when balls, parties, operas are in vogue, many of the photographers derive much work from the desire of the public to perpetuate certain occasions by photographs in the costume or dress worn for said occasion. But as there is a great deal of inconvenience in being obliged to dress over again in the same costume on the morrow, the desire remains ungratified in the majority of cases. Mr. Kurtz has solved the problem, however, and parties can have their photographs taken after the opera by returning home via Mr. Kurtz's studio. It is proper to state here in conclusion that Mr. Kurtz has obtained patents covering the main features of his system.

A Colliery Telephone Service.

A Bell telephone has been fitted up in the Marie pit of the Cockerill Company's colliery at Seraing, Belgium, and has worked without a hitch since the second of April last; so satisfied, indeed, is the company with the experiment, that it is about to put down a telephone in all its shafts. The apparatus on the surface is placed near the winding-shaft, at a point easily accessible to both the day and the night hands. The underground instrument is placed in the main rolley-way, and the wire is protected by gutta-percha, being attached to insulators about every fifty yards. This wire is kept as far as possible from that of the electric signal, so as to avoid any induced currents, which would give rise to difficulty, and even danger; for when the telephone was first put down in the Marie pit, and the call-bell of the telephone was rung, the electric signal was heard at the same time, which misled the banksman. The telephone is found to render great service in the colliery, the ease of communication saving a great deal of time. In the event of an accident to the ropes, the cages leaving the guides, the derangement of the cage signal (whether electric or otherwise), or a stoppage from any cause whatever, instantaneous communication may be made from the bottom to the surface, or *vice versa*.

The Voice of the Storm.

A correspondent of *L'Ingénieur Conseil*, signing himself with the initials "E. B.," occupied himself during the violent thunderstorm which occurred at Brussels on June 30 in listening to the storm sounds on the telephonic wire. It was, of course, furnished with a good lightning conductor, and, under such circumstances, he is convinced that the experiment was not attended with danger. During the height of the storm there was a continuous noise, which could only be compared to that of frying. From time to time it would grow louder; sometimes there would be a little popping sound, like a bubble bursting; sometimes the series of crackling noises which follow the fall of a drop of grease on a red-hot iron plate. This last noise came abruptly and loud with each flash of lightning, and seemed to precede it. The observer was satisfied that his ear was surprised by the sound before his eye was surprised by the flash. The same noises were often produced when there was no accompanying flash, but then they were less loud. Their force seemed to have no connection with the peals of thunder.

On the 600 lines of telephone wire which focus at Brussels, not one apparatus was damaged by the storm, its effects being altogether expended upon the lightning conductors and storm-warning apparatus. This security may encourage other observers to follow the example of "E. B.," who considers that in this manner it is possible to obtain valuable contributions to the study of atmospheric electricity. He is of the opinion that the constant noise heard in the wires proves the existence in them of a current of atmospheric electricity flowing into the earth, and that a network of telephonic lines overspreading a town would be its best possible protection against lightning.

"TOO TALL" FOR TEXAS.—After enjoying a ride on the electric railway at the Southern Exposition, in Louisville a man with sun-browned face and wearing a sombrero exclaimed, "I've seen something we ain't got in Texas and they'll call me a liar when I tell 'em I rode around a ten-acre lot on a railroad that was run without steam or fire."—*Louisville Courier-Journal.*

A Government Telegraph.

The following letter is from an esteemed correspondent in the West and an official on one of the railroads west of the Missouri River. It is well worthy of the consideration of every one identified with telegraphy:

To the Editor of the Electrical World:

SIR: With regard to the proposed Postal Telegraph, *i. e.*, a government system of competing lines, it seems to me that, as a friend of the operators and one who wishes to see the business elevated (made *respectable*) you should give this proposition your earnest, constant and hearty support and influence. The idea of leaving the existing companies alone, allowing them to run their business as they please, and at the same time for the government to provide telegraphic facilities in connection with the mail service for all who wish to patronize them, appears to me to be the only possible solution to the problem of how to check the one-man power of the Western Union; to establish a scale of fair wages for operators, and to provide a means by which good men could look forward to promotion.

In this country government employés are, as a rule, paid fair wages. I have no idea that first-class operators in the government service would be paid less than $100 per month—the pay of *first* (third) class clerks in the departments at Washington. The establishing of fair wages by the government would compel the companies to pay the same or better wages or suffer the loss of their best men.

The only objection which I can see to the project is the increase of government patronage, but that could be largely avoided if wisely guarded in the plan of organization, and, even if impracticable, it would not have much weight, because the comparatively few telegraph employés in any one place would not affect political parties very much one way or the other.

Very much more could be said in its favor. It is reasonable to suppose that the government system would in all respects be first-class, and that the delivery department would be conducted by men and not by *little boys*, and the improvements introduced would naturally force the Western Union and all others to compete with at least as good service.

"Underground Communications."

To the Editor of the Electrical World:

SIR: In your issue of Aug. 25 you publish an article under the title "Underground Electrical Communication." That article contains an error of statement, or rather a misleading one, no doubt due to inadvertence on the part of the writer, or perhaps a clerical miscopy of what was intended. In speaking of the requirements of the telephone the writer is made to say, "Retardation not only delays but modifies and distorts the signals. The sound produced by the voice must preserve certain and great rapidity of changes, and when retardation is so great that signals cannot be transmitted with this necessary rapidity then said sounds are so imperfectly reproduced as to become partially or wholly unintelligible."

This statement would be in the main true if the telephone should be applied to a submarine cable or underground line from 500 to 2,000 miles in length, but for short distances, within cities, of not more than 10 or 12 miles, it conveys an erroneous impression.

The error of the statement, so far as retardation is concerned, lies in the words that "the sound produced by the voice must preserve certain and great rapidity of change."

This is made the premise upon which the conclusion of the whole sentence is based. Whatever that rapidity is taken to be, or what effect *dynamic* induction may have in modifying the sound producing waves, it is readily proved that retardation presents no appreciable obstacle to the practical use of the telephone on short underground lines within cities.

It is a well-known fact in acoustics that sounds following each other in quicker succession than twelve per second produce upon the ear the sensation of a continuous noise, and not that of distinct sounds. Therefore that number of changes per second in the voice current on an aerial line or a closed metallic circuit would produce only a voice prolongation and not articulate speech. In fact, any one can learn by his own attempt at the telephone that his voice changes cannot exceed three or four per second.

Now, in regard to the velocity of electric currents and the reduction of that velocity by the principle of retardation, it is well understood that no conductor, whether in the air or underground, can be so perfect as not to have at least some retarding influence.

If, however, we take the lowest known velocity of electricity in submarine cables—that recorded by Whitehouse, which was 816 miles per second in a cable 1,020 kilometres long—we will observe that with a telephone line *equally as good a conductor*, and ten miles long, there would be *time-room* for over eighty distinct pulsations within a second. But twelve would make a continuous or blended sound. Therefore, so far as retardation is concerned, a telephone line thus conditioned and ten miles long would be at least seven multiples away from danger of influence on articulation from that cause by itself.

But Faraday has pointed out that in the cases of short circuits or intermitting currents (or evidently also wave or variable currents) static and dynamic induction are constantly passing into each other. All of which leads to the observation that for a proper underground construction we must avoid hair-sized wires in our lines and cables and adopt the heroic rather than the liliputian in our methods.

As distance in electricity is measured by conductivity in the wires, a proper underground telephone line, even for the shortest circuits, should have plenty of metal arranged in the best relation to counteract *dynamic* induction, rather than static charge, and its co-instant retardation.

SYDNEY F. SHELBOURNE.

NEW YORK, Sept. 1, 1883.

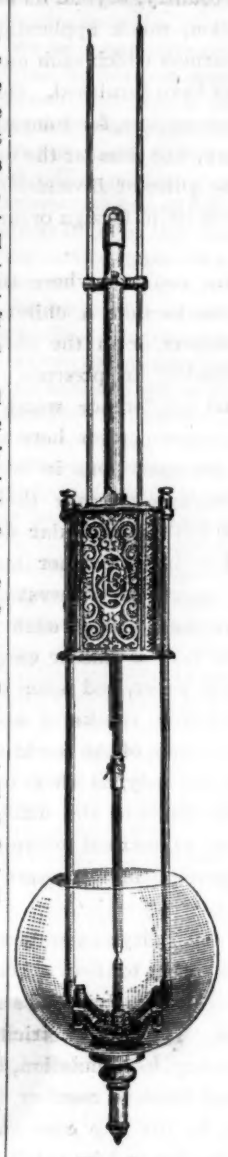

FIG. 6.

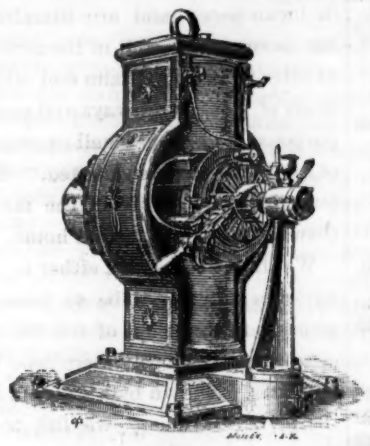

FIG. 3.

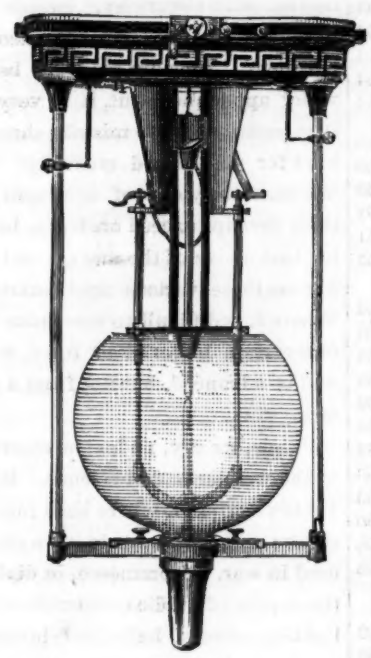

FIG. 4.

Electric Locomotive Headlights.

The conception of illuminating the railroad track by means of an electric light attached to the head of the locomotive has long since ceased to be a novelty in railway engineering; while the advantages to be derived therefrom, if successfully accomplished, have furnished sufficient spur to urge inventors to the greatest possible researches and endeavors.

Success, however, has been rendered very difficult from the fact that the oscillations and jars of the engine while in motion soon destroyed the delicate apparatus of the best electric lights known, and that a cheap and convenient method of generating the electric current not immediately dependent on the continuous movement of the locomotive proved difficult to obtain. In 1881 Mr. Sedlaczek, chief of the telegraph service at Leoben, in Austria, aided by Mr. Schuckert, of Nuremberg, after six years of trial, succeeded in obtaining, it is affirmed, these two great desiderata, first by adopting as generator a Gramme machine, with a Brotherhood motor furnished with an automatic regulator, having likewise attached thereto a Schuckert dynamo-electric machine. To obtain sufficient current required from 700 to 800 revolutions of the electric motor, demanding about three-horse power, being less than 2 per cent. of the force of the locomotive; and, second, the light was procured by a Sedlaczek lamp, invented specially for the purpose, having a force of 500 carcel jets. The electric machine was placed on the boiler, just behind the smokestack, and brought under the immediate control of the engineer.

FIG. 5.

The first experiments took place in September of 1881, between Leoben and Judenburg, on the "Kronprinz-Rudolf Bahn," a distance of fifty kilometres, with great success, it is affirmed, to the end that the road for a kilometre before the locomotive was rendered light as day. The white signals were marvelously brought out upon the black background, and the lamps and lights appeared like yellowish points. The same experiments tried last October between Munich and Diesenhofen, of the Munich-Salzburg Line, resulted in even greater success, as may be seen from the official certificate of the President and secretary of Commission of Experts named by the Munich Electric Exhibition, a copy of whose translation accompanies this communication.

Merger of the American Rapid and Bankers' and Merchants' Companies.

On the 13th inst., as reported last issue, stockholders representing about five-sixths of the capital stock of the American Rapid Company met at Hartford, Conn., and voted to give control of their lines to the Bankers' and Merchants' Company, of New York. A meeting of the directors of the American Rapid was held at Boston on the 14th. A. W. Dimock, John R. Hageman, G. S. Mott and G. Putnam Smith were added to the Board of Directors in fulfillment of an understanding whereby the men controlling the Bankers' and Merchants' Company are to control the American Rapid. Mr. Dimock, who is now president of the Bankers' and Merchants' and the Southern, will, it is stated, take the presidency of the Rapid, and Mr. G. S. Mott, general superintendent of the Bankers', will extend his supervision over the three systems. While no actual consolidation between the Rapid and the Bankers' has taken place, the admission of Messrs. Dimock, Mott, Hageman and Smith to the directory of the first-named company practically places that company in the hands of the Bankers' and Merchants' stockholders. The $3,000,000 of bonds of the Rapid Company, which are to be issued for the purpose of extending the lines of that company to Chicago, St. Louis and the Southwest, will be taken up principally by the Bankers' and Merchants' people. Besides the four directors elected, the directory of the Rapid Company includes J. W. Converse and Frank Morrison, of Boston; Frederick H. May and A. H. Barney, of New York, and George B. Chandler, of Manchester. By the combination of the Rapid, Bankers' and Southern systems it is alleged that messages will soon be sent as far west as Chicago and St. Louis, and south to Savannah and Charleston. Six new wires of the Bankers' line are being stretched between New York and Washington. The organization of the Rapid Company is kept up by reason of the laws in some States forbidding telegraphic leasing or consolidation. The only vote of the Rapid Company's stockholders against ratification represented 200 shares of stock.

Another Suit for Strike Damages.

Apparently some time will elapse before the last suit is brought to recover damages for delay or failure in delivery of messages by the telegraph companies while the strike lasted. A dispatch of the 15th from Philadelphia states that suit was entered against the Western Union Telegraph Company on that day by Paul Boner, a professional musician, to recover damages for the company's failure to have a telegram that was filed with it during the prevalence of the recent strike delivered. The dispatch was filed at Asbury Park, N. J. It contained the offer of a position as a pianist for four months at $75 a month to Mr. Boner, who was then staying as a guest at an hotel at Cape May. Mr. Boner never received the telegram and did not hear of the offer until after the situation had been filled. He claims as damages the amount of the salary for the four months.

An Electric Dividing Machine.

At the eighteenth corporate meeting of the Boston Scientific Society, on Wednesday, the 12th inst., President Ritchie called attention to a new dividing machine which graduates circles with great accuracy. It works by electricity, and supersedes largely the old ratchet wheel. He spoke of an instrument of Professor Rogers', whose coarsest work is 200 lines to an inch, and which, the professor says, can make a million lines to an inch. But a microscope can only see about 150,000 lines to an inch, and unless the diamond which makes the lines is a singing diamond, there is no way of learning whether the instrument is working properly. An elaborate dividing instrument was spoken of which was made in 24 hours, which is better than one the Waltham Watch Company was over a year in having made at a large cost.

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THE DOMAIN OF THE MARVELOUS.

Our esteemed English contemporary, the London *Electrician*, in an able article on the "Wonderland of Science," within whose borders it places all that pertains to electricity, intimates its belief that the love of the marvelous in America is without parallel. The *Electrician* is of the opinion that the people of this country, "if we may judge by their scientific organs," are peculiarly infantile, not to say idiotic, in their devotion to that realm of delightful mystery. The crops they raise on its fertile soil, it asserts, are so large that while they are able to export wonders wholesale, they can keep an enormous quantity for domestic consumption. The tone and sentiment of the article are fairly expressed in its concluding sentence, where, speaking of an alleged American discovery of a means of storing wind-power, it says: "There is enough wind—scientific wind—in the United States to keep the whole world in a breeze without the help of a store; but it must be owned the demand for it has not yet failed, nor probably will fail so long as the world retains its pristine taste for the wonderful, and its preference for unexplained marvels."

Certainly the flatulency attributed to American scientific organs would appear to be fully set off by the atrabilariousness betrayed in the above passage; but we venture to think that our contemporary had no intention to say rude things about the journals with which we humbly class ourselves.

It is no doubt true that many wonderful applications of electricity are daily recorded. Some of them "give us pause," but whether we believe in them or not, it is one's duty to record them. Besides, it may be boldly questioned whether more "marvels" originate on these western shores than among our kin beyond sea. Only this week the representative commercial paper, *Bradstreet's*, an impartial authority, remarks: "Foreign trade journals record a more rapid and various application of electricity abroad than has been noticed thus far in the United States. It is extremely doubtful if in this country, beyond its use in incandescent and arc illumination, much application has been made of it in the new harness which such men as Edison, Brush, Maxim and others have furnished. One hears of electric railways and electric motors, for domestic purposes and other small machinery, but thus far the use of the same has been limited." The editor of *Bradstreet's* evidently finds more of the marvelous in foreign organs than in those published at home.

We fail to observe, either in this country, where the nation is supposed to be so young as to take a childish pleasure in the tricks of marvel-mongers, or in the older countries of Europe, where good breeding, in presence of surprises, is shown by a stoicism and indifference worthy the barbaric Indian—we fail to observe either here or there any special signs of a love of the marvelous in connection with electricity. People long ago got over their wonder at the revelations of science in this particular department. They are ready to believe in its further and wider application, but it is very superficial observation that leads a critic to mistake shrewd eagerness of such a kind for mere blind credulity. To take a similar case: We hear every day of new uses for paper, and some of them perhaps exceed credence, but no one thinks of saying that a love of the marvelous leads men of the world to discuss these various applications seriously, as they do. Where it is difficult to determine the limits to the utility of a certain material or force, some chimerical schemes will be advanced, but not from a puerile delight in marvel or mystery.

People, we say, no longer regard electricity as a province of the wonderland of science. It is rather to them a Tom Tiddler's ground, where keen men are picking up gold and silver; and they want to get a share. They see electricity used in war, in commerce, in diplomacy, in speculation, in the supply of public convenience and domestic comfort, in lighting streets, halls and houses, in running cars and machines, in telegraphing, in telephoning and in cabling. With all this before their eyes, they would be sad objects of pity if they could not by the aid of imagination fill the future with the triumphs of a mighty agency whose present achievements are useful chiefly by way of suggestion.

A Government Postal Telegraph System.

The letter of an esteemed Western correspondent upon the subject of a government postal telegraph system is a concise statement of one side of the case, and as the subject is destined to become highly interesting to us all, it should be carefully studied by every one. One of the many advantages of the recent strike is the great impetus which it has given to the public discussion of this great question. Efforts in this direction have hitherto been sporadic, bungling and feeble, and have died naturally from want of support. Now that the subject is being revived, and in better shape, it is important to the success of the measure itself that zeal should be tempered with discretion, and that both sides of the question should be adequately represented, and to this end THE ELECTRICAL WORLD would be pleased to allow both sides an opportunity of setting forth their case in public.

The entire question is a perplexing one, and many theories have been advanced, all having their own school of advocates. Two years ago Mr. Jay Gould held—or rather, to be precise, expressed in the *Herald*—the opinion that it was governmental interference that precipitated the panic of 1873. Now, Mr. Gould means well—at least we are willing to give him the nominal credit of meaning well—but his sweeping statement may be doubted by many, and as it lies at the very foundation of governmental control of civil affairs, it should be controverted by the advocates of the proposed Postal Telegraph.

Our objection to a government monopoly has, thus far, been based upon the odiousness of a private monopoly, on which the government could, we think, scarcely improve, and upon the general theory that such governmental monopolies are repugnant to republican institutions. Independently of the gross imperfections of our civil service—which, however, has recently been greatly improved—it is still a question with us whether the typical economical telegraph official is better or worse than your average cheese-paring Congressman, and if the situation would be improved by supplanting General Eckert and the present officials with a new swarm of political office-holders and dude statesmen picked hap-hazard from that seething maelstrom, the "ring." And, leaving the political aspect out of the question altogether, it is a positive fact easily proved by figures, that private enterprise in the United States has met and meets the public demands for telegraphic facilities more rapidly and efficiently than does the government service in England. We have already declared with emphasis that we believe it is a bad way to cure the evils engendered by the greed of railroad, telegraph and other corporate monopolies by asking paternal protection from our government and a consequent monopoly greater than them all. Such a system paralyzes enterprise and the introduction of improvements, as was clearly proved recently when the British Post-Office Department so strenuously opposed the introduction of the telephone in England. Even without this fatal objection, we believe it is a fair matter for discussion whether or not it is proper for the government of a free people to enter the field of commerce as a competitor against its own citizens; and, if it is, why should not the Government go into the business of sowing, growing, gathering and selling wheat because speculators sometimes get up a "corner" in that commodity? Why should it not progress from that to baking good bread and churning hairless butter, and so competing with that worst of all petty frauds, the poor man's corner grocery? There would be no end to this "reform" until the Government monopolized everything. To come back to telegraphs, we do not see that because a private system of telegraphy has been woefully abused there is any valid reason why private enterprise should be exterminated. We still believe that the people of America can right their own wrongs without the assistance of any political Moses and Aaron; that they are as a body slow to look to their government for aid in that which they should do themselves through lively competition, and that if they do not choose to risk their cash in an honest competitive concern they have no right to complain of the consequences.

The foregoing remarks apply, of course, to a government monopoly, which has hitherto been the prevailing idea. The communication of our esteemed Western correspondent relates only to a governmental system of competition, allowing every one who shall choose to compete for public patronage, and on this point particularly we should like to hear calm discussion. It seems to us that the existing companies would, under that arrangement, confine their efforts to the thickly populated Eastern and Middle States, which would afford good dividends at a low tariff, inasmuch as the bulk of the business is done here, and leave to the government the costly and unprofitable task of serving the small towns and the prairies and backwoods. This would result, if the whole coudnry had to be served with telegraphic facilities, in the competing corporations making all the money and the government sustaining a great loss anually. The plain fact is that our Post-office Department can scarcely be called self-sustaining now, and it will, for some time at least, be less so after the introduction of the two-cent postage next month. The deficit in the Post-office Department for the past ten years will aggregate fifty million dollars, and if a non-paying telegraphic service competing with the present system were to be tacked on to the department, there would arise the question whether or not people who telegraph seldom or never should be heavily taxed for the benefit of brokers and merchants who are telegraphing all the time. All these considerations should be made the subject of earnest discussion. Meanwhile we may see what may become of Bonanza Mackey's new scheme, in connection with the existing postal lines, and we should like, furthermore, to see the unpublished report of the Committee on Post-offices and Post-roads, presented to the last Congress just before the adjournment, in which it is said are several feasible propositions for relief.

Another fruitful source of discussion will be found in the assertion of our esteemed correspondent that operators would be treated better in the government service than they are treated now. Every one who reads knows that operators in the Signal Service complain bitterly of their lot, and during the late war those engaged in the military service had still greater cause for complaint. They held no definable position, no rank, and while others in the Quartermasters' and Subsistence departments are now drawing snug pensions, the military operators, who braved all that these men did, through flood and field, get nothing—not even recognition of their patriotic service. In England the operators have been on the verge of a strike within the last two years, because they are not ranked as government "clerks," but are relegated to the category of sorters or carriers of the mails. They have had practically two strikes over there since the government took charge, and an official report shows that in 1872—one year after the government got possession—about one-third of all the operators in England, Scotland and Ireland left the service for more remunerative employment elsewhere. We mention these facts as a guide to the deliberations of our readers and not with the idea of producing a drawback to their enthusiasm.

We cannot, however, in any case, ignore the tendencies of the times, and they are decidedly in favor of a government supervision of, or opposition to, the present system of telegraphy. In fact, the matter has become one of national policy. The Legislature of New Hampshire and many trade assemblies have recently demanded a postal telegraph; the drift of popular opinion is unmistakably in that direction, and the Legislatures of other States will doubtless formally instruct their Senators and Representatives in Congress to push the scheme, which should insure

a thorough and impartial discussion of the subject in Congress and in the newspapers next winter.

The scheme of a governmental competing line has a good backing in the fact that everything is being done nowadays by "consolidation," as they call it—the massing of vast capital and the concentration of tremendous efforts. Our government could combine all these qualifications—if they are qualifications—in an eminent degree; by paying reasonable salaries it could secure the best and most efficient operators—the flower of the telegraphic flock; it could, by employing competent engineers, build new lines and duplicate the present Western Union system for $40,000,000—one-half the present capital of that water-logged concern; and, having even now the nucleus of a great national telegraphic system in the existing Signal Service lines, it could be quickly extended. We would then have at least one "company" which could not be sold out on "pool," a consideration for which we could well afford to put up with the ills enumerated.

The True Philosopher's Stone.

One of the leading tenets in the creed of the old alchemists was that by means of the philosopher's stone baser metals might be transmuted into silver and gold. It is recorded of the Roman Emperor Caligula that he even caused experiments to be made for the production of gold out of sulphuret of arsenic, and the superstition that inspired him lingered until the Middle Ages and the awakening of science in the time of Lord Bacon.

After all, the search for the philosopher's stone did little or no harm. Some men sought from a desire of wealth, others from a desire of knowledge; but the common result of their endeavors was the advancement of true and practical chemistry, and to a certain degree the discoveries of modern science in allotropy afford some justification for the ancient workers in the alchemic arts.

It has been reserved for this later day to unearth the true philosopher's stone and enjoy the incalculable benefits which it can confer. That stone is a well established patent in universal demand, and very often the hap-hazard discovery of a modern scientist now proves more profitable than all the arduous endeavors and life-long experiments of the groping alchemists. Nor is much practical knowledge of the arts and sciences always required to hit upon a paying patent. Enormous fortunes are made out of the simplest contrivance and the pettiest toys, and some of the wealthiest men in this country are those who have had a happy thought in mechanics and have duly secured its fruition to themselves under a patent.

Everybody sees now-a-days, therefore, that to possess a good patent is to hold the true philosopher's stone; that to invent is to enter upon a royal road to riches; and hence is explained the rapid growth in the business of the Patent Office. The report submitted by the Commissioner of Patents to the Secretary of the Interior, of the business of his office during the fiscal year ended June 30, 1883, is, as far as its figures of growth are concerned, a credit to the country. Once it was said of the English people that they were a nation of shopkeepers. Now it might be said with more justice and equal epigrammatic force that the American people are a nation of inventors. It appears that the applications, all told, numbered 35,734 as against 30,062 last year. The number of caveats filed was 2,688; the number of patents granted, including reissues and designs, was 21,185; the number of trade-marks registered was 883, and the number of labels registered was 618; making a total of 22 686. The number of patents withheld for non-payment of final fees was 2,056, and the number of patents expired was 7,471. The receipts from all sources were $1,095,884; the expenses, not including printing, $677,628, the surplus being $518,255. The increase in receipts over 1881 was $305,989, and over 1882, $165,020. The number of applications awaiting action on the part of the office on July 1, 1883, was 4,699, an increase of 39 per cent. over 1882.

From this statement it is clear that while the business of the office has largely increased, expenses have been kept down in such a way as to leave a handsome surplus. Economy is all very well in public departments, and upon general grounds we approve of it heartily, but never was there a plainer case of the wrong application of a sound principle than in the present parsimonious management of the surplus-earning patent office. The Commissioner raises the voice of bitter complaint at the meagre allowance made by Congress and at its refusal to sanction the employment of a larger clerical force, and he says, pointedly: "I have learned with great satisfaction that inventors and manufacturers throughout the country will soon take steps to impress upon those who have hitherto treated their rights with some indifference the importance of having a sufficient force in this bureau—as well as other appliances and accommodations—to fairly and promptly act upon their applications and determine their rights to the inventions claimed by them."

In calling attention to the numerous resignations of examiners during the year, assigning as a reason the insufficiency of their salaries, he adds:

"The same reasons substantially which require an increase in the force of the offices in order that the work may be promptly and efficiently done, exist for urging proper salaries to secure the most efficient men to do this class of work. Inventors, manufacturers and others interested in rights secured by patents for inventions are entitled to have men perform the work committed to the office intelligently and efficiently."

We have ourselves suffered from the inadequacy of the force. As our columns testify, much of the increase in the Patent Office work is due to the extending application of electricity, and yet it is alleged that the corps of examiners in the electrical classes average less than two years' service each. The men are without fair inducements to stay. Moreover, it was only last week that we had to protest against delay in the mailing of the *Official Gazette* and other matter ordered for this journal from the Department.

Various other suggestions of weight are made in the report. One refers to legislation, and it is recommended that Congress confer upon the Commissioner the authority to institute proceedings to determine the question of the public use or sale of an invention. At present, in ex parte cases, and where there is not an active and interested opponent to the issuance of a patent, but simply an informant of facts which tend to show that the invention has been in public use or sale more than two years prior to filing the application, there is no provision of law which authorizes the Commissioner of Patents to institute such a proceeding as to make any inquiry beyond the information possessed by the employés of the office. With regard to the patent fee, it is said:

"Greater liberality might, perhaps, be extended to the inventor by reducing the fee to be paid before a patent can issue, and with beneficial results; certainly a more equitable rate of fee could be adopted than is now provided by graduating the fee to the character and nature of the invention for which patent is applied. The fees now required in some cases are excessive and in others exceedingly small. In this way, rather than by an indiscriminate reduction in the fees now charged, as is urged by some, justice would be secured and the office still be self-supporting."

Once more the attention of Congress is directed to the necessity of amending the statutes relative to the issue of foreign patents, either by granting the patent for a definite term where the invention has first been patented in a foreign country or countries without any conditions subsequent, or by granting it for the full term of seventeen years from the earliest foreign patent. The Commissioner says:

"If patents are to be granted at all where the inventions have been first patented in a foreign country the rights of parties under such patents should be rendered certain, and this can only be done by proper amendment of existing laws."

A concluding and valuable recommendation is that the United States courts be required to furnish, for publication in the *Gazette*, copies of all their decisions involving the validity of patents. In this way a codification of patent case law can be expected, and probably a greater uniformity of ruling obtained.

The current fiscal year will see as great activity in the field of electrical invention as any two that have gone before, and from this cause alone the work of the Patent Office will grow. Many a hopeful Micawber or Colonel Sellers will be disappointed because his electrical patent is not exactly the good thing that was expected to turn up and because there are not millions in it, but taking the whole science of electricity, there is no reason to doubt that various valuable inventions in it will be made, promoting human and civilized progress, and laying the foundations of not a few private fortunes.

Underground Communication.

A valued correspondent, in a letter published elsewhere in this number, criticises a statement in a recent issue regarding retardation. The article to which he alludes was a reprint from the circular issued by a Sub-committee of the General Committee on Underground Communication, for the purpose of setting forth the requirements of a perfect underground system. Although we agree with our correspondent that the phrase he refers to might have been improved by more apt and precise phraseology, yet we believe that the idea which it conveys is correct, and that on this score it needs no apology or modification. It seems clear to us, and probably to all practical electricians, that the term "signals" as used in this phrase is intended to denote "impulses" or "waves," and that the expression "rapidity of change" refers to the change of electrical condition which causes the impulses in the line. The ground upon which our correspondent assails the statement quoted by him is absolutely untenable, both in theory and in practice. His conception of induction, of retardation, and the conditions of their appearance appears to be entirely erroneous. He is evidently unaware that it is exactly "the influence of *dynamic* induction in modifying the sound producing waves" which is chiefly responsible for the annoyance known as retardation in telephonic lines, and not *static* induction, as his concluding observation leads us to infer.

Retardation is the consequence of a reaction which induced currents, *both* static and dynamic, exert on the impulse of current which causes the induction. Whenever an impulse of current is permitted to cause induction, the character of the induced current is always such as to oppose the inducing current, in accordance with the well-known law of Lenz, and it is this opposition which retards the current. Consequently the greater the induction the more perceptibly is retardation experienced.

The human voice consists of a succession of tones of varying pitch articulated in a connected manner. In order to reproduce the vocal sounds faithfully at the distal end of a telephonic line every vibration constituting each tone must cause a distinct impulse of current to be transmitted over the line, and for this purpose the electrical impulses must succeed each other at the rate of from 150 to 1,000 per second, according to the pitch of the tones. If during the transmission the impulses experience retardation they blend into each other, for the succeeding impulse arrives before the first one has subsided. Thus instead of 300 vibrations there may be only 150 or a much lower number per second transmitted. The lowest audible sound requires at least 16 vibrations per second. This is the deep bass sound produced by an organ pipe 32 feet long, and it would be difficult to render this sound audible in a telephone. Even the octave higher, which has 32 vibrations per second, is heard with difficulty. We can now understand what the effects of retardation are. Each syllable corresponds to at least one enunciated or articulated tone. The waves of certain tones of a word become bleaded together when transmitted at a rate above a certain number per second (the limit depending on the amount of retardation), and only one impulse, equal in length to them all, is received at the end of the line. This single impulse is, of course, inaudible. The result is that this part of the syllable is unheard, causing a break in the word. Monosyllables pronounced with but one movement of the glottis may also remain unheard, for the reason that the impulses become blended into a single one. Sometimes the impulses of a tone appear to blend together by twos or threes, so as to lower the rate of transmission, and the corresponding tone, instead of being of the pitch at which it was spoken, say 300, is then heard one octave lower (150 vibrations) or more (100 vibrations). Thus speech when transmitted over a line subject to retardation not only becomes incoherent from the loss of a part of the syllables by the blending of a part of the impulses, but it loses its rhythm from the alteration experienced by the remainder of the impulses during transmission. It requires considerable effort to hear and still more to understand the words. The effects of retardation are plainly observable in some of the telephone cables in use in New York City, to connect points varying from a three to five miles apart. This fact is sufficient of itself without further argument, to meet the statement of our correspondent, that retardation will not occur in underground systems less than ten or twelve miles long, because the retardation would be as great, if not greater in an underground system than in an aerial cable. This can be readily seen. In a system of underground or aerial conductors, intended to accomodate telephone circuits, in company with circuits for all other purposes, the telephonic circuits must be protected from all inductive influences, so that outside currents will give rise to no annoying sounds in the telephone during its use, and the circuits intended for the telephone must be all inductively distinct from each other, so that the messages may not be transferred by induction to other wires parallel with them. The only practical method at present available for preventing these undesirable effects of induction is to carry off or divert the induction, and prevent it from extending beyond a certain range. This is accomplished by placing conducting materials near or around the wires, so that circuits are formed which prevent the inductive effect of impulses in the wire from extending outward to other wires. By this procedure the induction is not diminished but rather increased, since the inductive circuits are nearer and more favorably disposed. We have shown above that when the induction is greater the retardation increases. The experience of telephone engineers is that when induction ceases to give trouble in neighboring wires in cables provided with these induction "drains," retardation begins to appear, and the practical working distance of the cable is thereby reduced. In underground systems, the retardation due to this induction will be greater yet, for the parallel conductors will be in large numbers and induction will be greater, in addition to which the static charge will be greater.

The observation submitted by your correspondent that we must adopt the heroic rather than the Liliputian is not warranted, therefore. It is well enough on general principles to measure distance by resistance and to make the latter as low as possible, but in this case distance is the fundamental unit of measurement, for it defines the value of the induction, and the induction defines the amount of retardation, under definite conditions.

An Electric Musket.

This is an age peculiarly prolific of devices for killing men. Next to electricity, perhaps no science has had more attention paid to it since the time of the great Napoleonic wars than that which is concerned with the destruction of men set in battle array, and vast sums of money, beyond the dreams even of American plutocrats, have been spent to improve and increase death-dealing appliances.

Of course electricity itself is as applicable to the purposes of war as to those of peace, and has been utilized

extensively by military men in this country and in Europe. The firing of cannon and torpedoes by its means is already an old story. Now there comes an account of a new invention called the electric musket. It is a musket which is fired by electricity, and dispenses with the percussion primer in the cartridge. Mr. Clair, of Belgium, is the inventor. The arm is an ordinary breech-loading musket without lock or hammer, and the cartridge is a metallic one. Instead of the primer in the base of the cartridge a copper wire runs through the powder and connects by a short piece of platina wire to a copper eye in a paste-board wad against the base of the bullet. The current, which is stored in an electric accumulator placed in the butt of the musket, or may be carried on the person, passes, when the trigger is gently pressed with the finger, through a small striker. The copper wire and the platina wire are made red hot and explode the powder at the front end of the cartridge. The arm is readily converted into a magazine gun by the use of a cartridge containing five or six charges, placed one over the other, and fired in quick succession. For this purpose the platina wire in the first wad is a little finer, for example, than a hair. The second is a little coarser, and so on, the others proportionally coarser. When the current is established, the first wire, which is the finest, is the first to get red hot, and fires the charge; a new contact, and the second charge is fired, and so on, the others in succession. The electric accumulator is about the size of a large watch, and may be carried in the fob. It is charged before starting, and remains charged all day.

The Electric Light in the British Navy.

A further use of the electric light by the British Admiralty is reported. The troopship Malabar, employed in transporting troops between England and India, has been fitted up with 395 Edison lamps, and the use of the dangerous portable lamps is rendered unnecessary. The distribution of the current on board the Malabar is made by 15 distinct circuits, each lighting a certain section of the vessel. Over 7,000 yards of thoroughly insulated wire is laid in sunk grooves in solid teak. Each of the distinct circuits originates in the main switch-board in the dynamo room, and is solely controlled by the artificer. The dynamos are the improved low speed Edison L type driven by Brotherhood engines at a speed of 475 revolutions per minute. The lamps are eight, sixteen and thirty-two candle-power. The official trial of the installation resulted most satisfactorily. A day run of six hours and a night run of two hours were made without a stop or hitch of any kind, and more elaborate tests were made with equal success of the extra work that could with safety be put on one set of dynamos and engines.

Two other large troopships, the Serapis and the Crocodile, are now to be lighted throughout by means of the Edison incandescent lamps, of which about 400 will be required for each vessel, some of eight and some of sixteen candle-power. The generating machinery will be duplicated to meet the contingency of a breakdown, and the dynamos will be of the Edison special slow-speed type for marine use.

The W. U. Time Ball.

One of the sensations of Broadway, New York, is the daily falling, at noon precisely, of the time ball on the flagstaff of the Western Union building. A few minutes prior to the fall of the ball, hundreds of business men gather on the sidewalk, at their store doors, or in office windows, and wait, watch in hand. Probably such a display of watches is not to be equaled the world over, except in Cheapside, London, just in front of Sir John Bennett's jewelry and clock store, when his imitation Gog and Magog strike the chimes, and Father Time lends them a hand. As the W. U. ball falls, the watches are at once put up, the business men resume their work, and the country cousin, who has gazed mouth-open at the sight, and has foolishly displayed his own watch, becomes the recipient of all sorts of delicate attentions from pickpockets, bunco steerers and others of the flash fraternity.

On the 14th inst., however, the expectant throng along a quarter of a mile of Broadway was disappointed, and many a watch went unregulated for that day. The electric current, by means of which the ball is dropped, had accidentally become broken, and therefore the ball remained up aloft. It is said this is the first time in five or six years that such a mishap has occurred. At first there was a grim whisper up and down the street, that the ball had actually "struck."

Three Thousand Human Harp Strings.

It has been recently remarked that the auditory nerve, divided into about three thousand harp strings, is incapable of receiving impressions from finer vibrations than those pertaining to sound; that while the organism of the inner ear may be injured, rendering ordinary audition out of the question, the proper rates of vibration may, if this harp of many strings be perfect, be communicated and received by it through other nerves in its immediate neighborhood. Thus a deaf person, holding a twanged cord in the teeth may hear the vibration by the inner ear through the mediumship of the bones of the head and the adjacent nerves. The audiphone will give no result on flesh or false teeth, or even on the lower jaw. Apparently there is a great deal more to be learned of the laws and irregularities of vibratory sensation.

A Telephonic Libel.

In our issue of the 15th we published the particulars of a suit brought to establish the validity of an order for grain, given over a telephone wire. The plaintiffs failed to prove that an order had been given, and thus the defendant gained a verdict. The case involved new legal questions and has been noted with interest. Now a case of libel by telephone is going to engage the attention of one of the Hamburg (Germany) courts shortly. A manufacturer conversed with the manager of his storehouse by telephone, and getting an answer he did not like he replied in an insulting manner. The man at the other end pretended not to have heard the remark and asked to have it repeated, letting a colleague receive the second and augmented edition of the insulting remark. In this way he secured a witness and was able to sue his employer for libel. This is probably the first instance of a libel suit based on telephonic conversation.

Underground Wires in Washington.

Statements were made in print recently that the Commissioners of the District of Columbia objected to the erection of any more telegraph poles within the fair city of Washington. It is said to be a fact that Congress was the first to condemn the unsightly masts by prohibiting their erection on or anywhere near the Capitol grounds. For several years every wire running into the Capitol has been through underground cables, and those familiar with congressional sessions know what a vast amount of telegraphing is done from the Senate and House galleries and at the offices in the public corridors. It has never been necessary to take up the cables since originally laid, and no complaint has arisen of interference in prompt transmission of business. The example thus established by Congress, it is understood, will be enforced by the Commissioners, and at no distant day all of the telegraph companies will be required to put their wires underground. An application has been successfully made before the Commissioners to inaugurate the movement by laying an underground cable for telegraphic and telephonic uses between the Capitol, White House and all of the departments, thus dispensing with the unsightly wires which now disfigure the buildings. The success of this enterprise will hasten the reform which the Commissioners have determined to enforce. The Standard Cable Company of New York will be permitted to lay an experimental line of cables by their underground system connecting the executive departments with the Capitol. If this works well the system may be adopted as the one to be used throughout the District. The Commissioners will not adopt any plan, however, until the committee of electricians now examining plans of underground telegraphy at New York, come to some conclusion and adopt some system. Pending this decision, experiments are to be allowed. The Commissioners fully intend to put all the wires underground as soon as any scheme shall be found to be feasible. The telephone companies have been permitted to erect a few new poles lately, but with the understanding that they are to be taken down on a 60 days' notice.

An Exhibition of the Daft Motor.

A party of gentlemen identified with railroad and manufacturing interests visited the works of the Daft Electric Light Company, in Greenville, N. J., on Thursday afternoon. The *Tribune* of this city describes the works as a long, low, two-story brick building, a laboratory and a shed or two, all inclosed by a high board fence. Two railway tracks, one of unusually wide gauge and the other unusually narrow, run through the grounds, and passing outside make a sharp curve and a steep grade within an eighth of a mile. A short distance away is a sawmill, which is run by electricity through a mile of wire. The laboratory on the inside—a plain, unpretentious structure—is made of lumber from this saw-mill, and is declared to be the first and only building ever constructed from lumber sawed wholly by electricity. The company was organized about eighteen months ago with a capital of $500,000. The stock is divided among about twenty-five persons, the majority of it being held by half a dozen men. Among the trustees are George R. Blanchard, vice-president of the Erie, and Robert Lenox Belknap, treasurer of the Northern Pacific Railroad.

The object of Thursday's visit was to inspect the running of cars by the application of electricity. The *Tribune* adds: The exhibition was made with miniature open cars on the smaller of the two tracks. The motor is easily managed, requiring only the turning of a handle to one side or the other to go ahead or run back, as may be desired. The electric current is transmitted to the rails from the stationary engine, by positive and negative wires connecting with either side, and from the rails to the wheels and through these to the simple machinery of the motor. The brakes are magnets of high power. While the question of insulation of the rails presented such difficulties in the practical working of the Siemens electric system in Berlin as to require the introduction of an overhead wire, according to the Daft system the "low tension" current admits of the running of cars over rails laid in the ordinary manner, and with no special precautions against contact with the earth or against floods. There is no attempt at insulation, in fact, and there is, consequently, absolute immunity from danger of shock or harm to human or brute life from contact with the rails. When asked what advantages are claimed for the electric motor as a substitute for steam locomotives for railways, Theo. Daft, electrician of the company which bears his name, said:

"Our locomotives would be one-third the weight of those now in use to accomplish the same work. They would be operated for less than one-half the present cost for fuel. As to speed, the electric motor is practically unlimited, because there are no reciprocating parts. The expense of constructing and keeping in repair is much less than for any steam motor. The best steam locomotives in the world are those on the Pennsylvania Railroad; these are 18 by 24 cylinder, with 6-feet driving-wheels, that consume 8¼ tons of coal per horse-power per hour, while our compound stationary engines which furnish the power require only two tons of coal per horse-power per hour. A 200 or 250 ton train running at the rate of forty-five miles an hour develops 625 horse-power, and the steam locomotive weighs, with the tender, fifty tons. We can condense the same energy into a twenty-ton electric motor and thus add thirty tons more paying capacity to the train. We can now actually accomplish a speed of seventy miles an hour with the armature on the shaft, and 100 miles an hour are possible. The reciprocating parts in steam engines are always elements of danger in the higher speeds. While we wholly do away with these in our motor, there is a constantly increasing energy in the direction of rotation at the periphery."

Among the interesting exhibitions of the power of electricity was the running of the saws in the saw-mill at the rate of 2,800 revolutions a minute by a current transmitted through a mile of wire, but more astonishing than all else was the running of the electric motor up and down a track with a grade of 2,000 feet to the mile. This feat, in which electricity laughed at the laws of gravitation and set at defiance all previous performances attempted by steam motors, would have seemed incredible had it not been witnessed by a dozen practical men.

The Electric Tram-Car in Paris.

The proposed electric tram-car trial was successfully accomplished recently in Paris by the French Electrical Power Storage Company. At three o'clock P.M. on the day chosen the vehicle, an ordinary three-horse tram-car, left the Place de la Nation, in the far east, and after traversing the capital through important thoroughfares reached the starting-point soon after six o'clock. A distance of thirty English miles was thus made in about three hours. The mute wonderment with which the soundless progress of the apparently animated car through the crowded streets was witnessed by the public may be imagined. There was not the slightest accident. Not a single horse shied throughout the entire route. Whenever there was an impediment, the driver, directed by M. Philippart, the manager of the company, who was ever on the alert, had no difficulty in bringing the vehicle to a standstill at a second's notice. The ease with which the car was turned off one set of tram lines and got on to another across several yards of unmetalled ground was likewise admirable. The locomotion is effected by means of Faure accumulators, weighing some fifty hundredweight, which are fixed under the tramway seats, and connected with a Siemens machine placed under the floor. The machine, which makes 1,200 revolutions a minute, sets in movement, by means of a pulley, an axle, to which are connected the chains which give impulse to the wheels. These wheels revolve sixty times to twelve thousand revolutions of the machine. The speed of the electric tram-car is nine and a third miles an hour on level ground, and five and a half miles on an ascent. The present tram lines are not well adapted for the new locomotion. On the newer lines the movement was sufficiently smooth, but on those that have been laid for some time there was a marked difference, and the actual working force was considerably lower than the indicated horse-power. The experiment, however, is considered to fully prove the practicability of electric tram-cars, and it may safely be predicted that before long they will take possession of the tram routes of the French capital. The estimated cost is one-half that of horse-trams.

The Lightning Rides the Bicycle.

A thunderstorm visited Springfield, Mass., on the 17th, and as there was a great gathering of the bicyclist clans at Hampden Park, a splendid opportunity was afforded to the lightning to display its peculiar powers. Traveling thither by way of the Western Union telegraph wire, it first struck the judges' stand and then burned off the wire inside the building. Then it made a dead set at the numerous bicycles stored there during the rain and at last came out on the further side of the building. Of course there were several bicyclists in the room, and they were temporarily stunned by the shock. They have no wish to see the lightning ride their machines again.

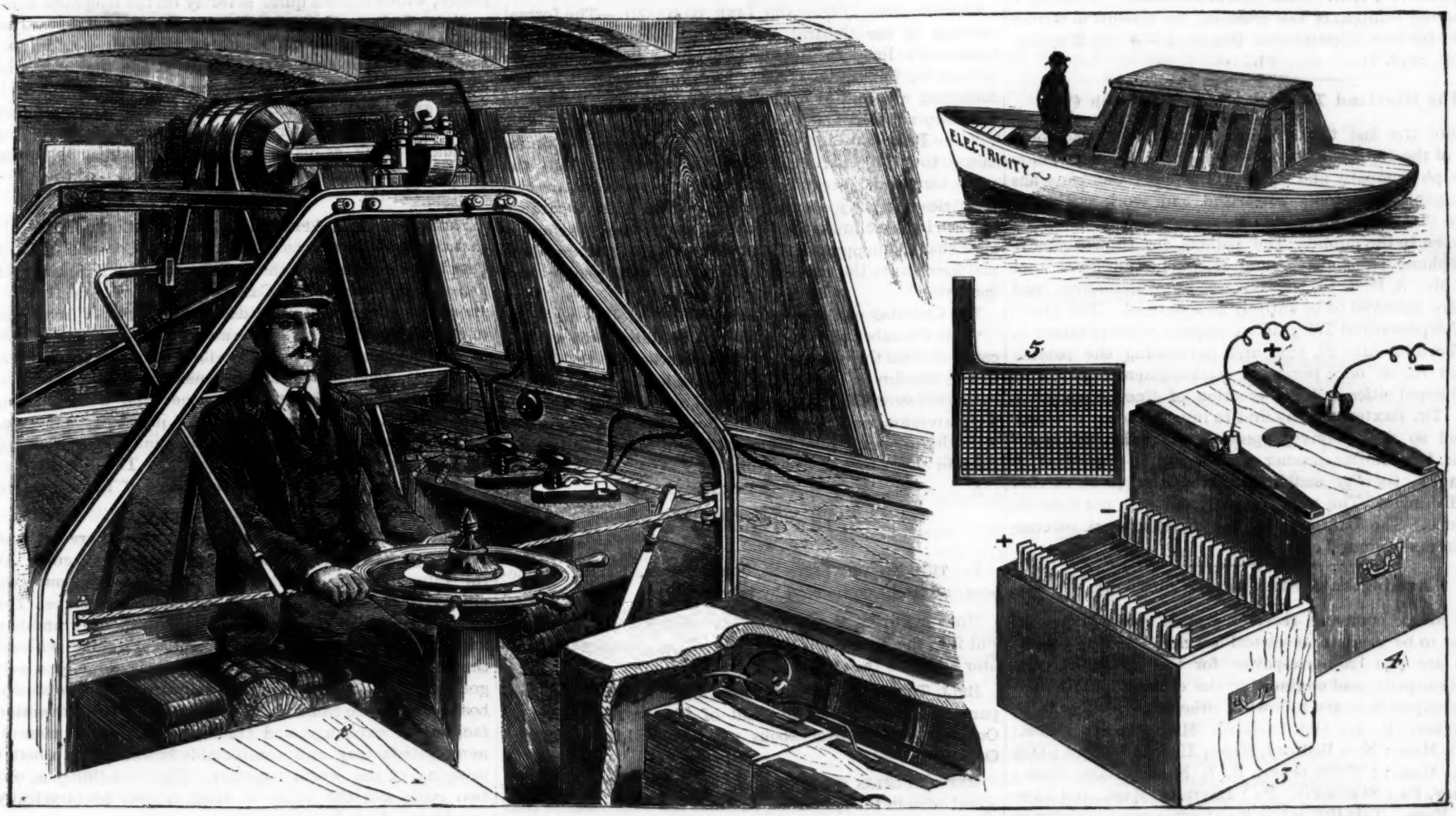
Accumulators in Navigation.

Mr. Edison is credited with saying that he believed electrical propulsion by water to be an idle dream. "It is impracticable, though not impossible," he said, "and the Yarrow launch can never be put to everyday use." The electrical launch to which Mr. Edison refers was recently completed by the builders, Messrs. Yarrow, and has been exhibited in London, where it attracted much attention from scientists and others. It is now at the Electrical Exhibition at Vienna. The boat is 46 feet in length, and is capable of accommodating some 49 or 50 passengers—an extraordinary number, in comparison with the carrying powers of any steam launch of corresponding dimensions. The whole of the boat, with the trival exception of a small space at the stern—hardly more than is sufficient for the "man at the wheel"—is available for use instead of having, as is the case of the best constructed steam launches, a large portion of the centre of it occupied by the machinery. Comfortable seats extend through the entire length of the launch on each side, and there is nothing to interrupt a promenade from end to end of it.

The motive power lies *perdu* in 70 boxes, each of one-horse power, stowed away under the floor of the launch, and at the end there is a Siemens D 2 dynamo motor, the spindle of which is continued so as to form the axle of the screw. There is no gearing whatever between the dynamo and the screw, to which 600 to 800 revolutions per minute can be imparted without the slightest noise, and a speed of from eight to nine miles an hour kept up with far less than the usual amount of wash. There is no noise or heat, or smell of machinery or smoke, and, as we have said, the whole of the boat is practically available for use, without any obstruction of boilers and engines. The advantage of such a motive power is thus in many ways quite obvious, and the cost of the launch complete in every respect is, it is said, only about $3,000. The London papers who have examined this craft do not seem to agree with Mr. Edison's opinion. The *Globe*, referring to the matter, says: "If we must have launches on our rivers, vessels of this type would be found as nearly as possible unobjectionable. The difficulty in the way of their adoption, however, as a substitute for steamers, consists in the fact that the accumulated power in the bottom of the vessel is exhausted in six or seven hours of full work, and the secondary batteries have then to be replenished. The practical utility of such craft is therefore limited by the necessity of arranging for their replenishment. Still, this application of the 'young modern giant' is interesting, and the new boat is, we suppose, the finest of its kind ever yet launched."

Readers of THE ELECTRICAL WORLD will, of course, remember the other electric launch, "Electricity," which was run on the Thames last year. This is said to have been only the third vessel ever constructed of which electricity was the propelling power. We are indebted to the courtesy of the *Mechanical News*, of this city, for the accompanying illustrations and description of this launch. It is 25 feet in length and about 5 feet in the beam, drawing 1 foot 9 inches forward and 2 feet 6 inches aft, and is fitted with a 22-inch propellor screw. On the trial trip on the Thames there were stowed under the flooring and seats forty-five electric accumulators of the Sellon-Volckmar type, which had been charged by wires leading from the dynamos in the works, and were calculated to supply power for six hours at the rate of four horse-power. These storage cells were placed in electrical connection with two Siemens dynamos, furnished with special reversing gear and regulators, to serve as engines to drive the screw-propeller, the arrangement being such that either or both of the motors could be switched into circuit at will. The party on board consisted of four persons, Mr. Volckmar being one of the number. The ability of the boat to go forward, slacken or go astern, at the pleasure of the commander was satisfactorily tested, and a speed of eight knots an hour was made against the tide. The return trip from London Bridge to Millwall, coming down with the ebb, was made in twenty-four minutes, the mean speed of the vessel being nine miles per hour. The actual expenditure of electric energy was calculated to be at the rate of 3 and 1-11th horse-power.

The launch will carry twelve persons. In the engravings Fig. 1 presents an exterior view of the boat; Fig. 2 the interior of the cabin, showing the arrangements for driving and steering; in the centre is the wheel for steering, and on the right of the steersman is the lever for reversing, and on his left that for starting and stopping. The switches with black handles are for connecting the secondary batteries with the two Siemens dynamo machines, the batteries being stowed under the seat, which is broken in the cut to show their position. Fig. 3 represents a secondary battery with lead plates ready to be fastened up; Fig. 4, a secondary battery with the lid fixed on, and with two lead plates on the top connecting the negative and positive poles of the plates inside the battery. In Fig. 5 is shown one of the lead plates of the battery.



PROPULSION BY ELECTRIC POWER—THE LAUNCH "ELECTRICITY."

Shake's Telephone.

"I guess I haf my telephone took out of my house," said a resident of Detroit, as he took a seat beside Manager Jackson the other day.

"Anything wrong?"

"Yes, eafrytings is wrong," was the doleful answer.

"Perhaps the battery needs more water?"

"Vhell, maybe so, but I doan' keep no track of dot. You see, I vhas down to my peesness a good deal. In der morning, after I vhas gone a leedle while, somebody ring aboudt 1,600 times and scares my old vhoman half to death. She asks vho vhas dere, und somepody answers: 'Hello! Shake, vhas dot you? Say, Shake, how aboubdt dot leetle gal dot wrote you dot letter? Ha! ha! ha!' Und dot makes my vhife so mad dot she shumps oop und down and pulls her hair, and vhen I comes home she goes for me like some tigers. Vhas dot der right vhay to put up some shobs on a man?"

"No, of course not."

"Und pooty queek after dot somebody else rings oop my house two tousand times, und my vhife almost faints avhay. Vhen she asks who vhas dere, somepody answers: 'Say, Shake, I saw you riding oudt mit your vhife on der Lake road last Sunday! Doan' be afraidt—I doan' give him away!' Und den my vhife vhas madt enough to bust in two, und vhen I comes home she sthrikes at me mit der teapot. Do you call him telephone convenience?"

"I call it a shame, sir."

"Vhell, some odder times somepody goes r-r-r-r-ringing-ing-ring like tunder, und my vhife vhas as pale ash a bedquilt. She tinks dot vhas some occident to me, or some steampoat blowed oop mit her sister. Her heart beats like it would shump oudt on der floor, und, vhen she asks who vhas killed, somepody answers: 'Ish dot Shake? Say, Shake, how much you gif dot policeman to keep sthill on you, eh? Ah! dot vas a fine racket, Shake, but, if der oldt vhomans drop on it, you vhas gone oop like some Gilderoy's kite!" Den my vhife she vhas mad some more, und she packs oop her trunks, und she vhas all ready to go vhen I comes home. Vhas dot some more convenience by electricity?"

"I shall certainly look into this matter. Such things must be stopped."

"Und sometimes somepody rings softly, shust like cats, und my vhife wants to know who vhas dot. 'Me! Who vhas me? Katie! Who vhas Katie? Vhy, Shake, doan' you know dot vidder vhomans you met on der boat? Say, Shake, how vhas der oldt vhomans to-day? Und how vhas dot on me vhen I goes home? Und how can I make der oldt vhomans pelief I vhas in my saloon all der time, und dot I doan' know some vidder vhomans from a load of hay I tell you, Mieser Shackson, dot telephone preaks oop my family if I doan' look oudt. Eafery day it is 'Hello! Shake!' und eafery evening when I gomes home it is some more crying und talking like I vhas der vhorst man in Detroit."

He was promised speedy and permanent relief, and as he backed up stairs to the sidewalk he said:

"Vhell, dot makes me feel like I vhas happy."

"If somepody vhants to 'Hello! Shake!' on me let him come to my saloon. I give him some telephone convenience so he vhas lame for six months!"—*Detroit Free Press.*

Mr. Pennock's Company.

The late Philadelphia manager of the American Rapid Co., Mr. George B. Pennock, has stated recently that he would be connected with another new telegraph company. A dispatch from that city says that he has now accepted the position of general superintendent, with a voice in the management, of a new system which is to extend from Portland, Me., to Washington, D. C., with numerous Western connections. The construction of the plant will begin on October 1 with the stringing of ten wires between that

city and New York. The company will use a duplex, the invention of Mr. Pennock. Philadelphia, New York and Eastern capital, he said, was launched in the enterprise although he was not prepared yet to give the names of the subscribers. The company will adopt the twenty-word basis, and make newspaper work a specialty.

The Wonders of Electricity.

A gentleman residing in New York telegraphed to a friend in Brooklyn his intention of visiting him in the latter city on the following day. As the purpose of his trip was business of an important character, he was careful to send his dispatch twenty-four hours in advance. When he reached his friend's house the latter was not at home. He thought it strange, but as his mission was urgent he waited. After five weary hours his friend arrived and seemed surprised to see him.

"Didn't you get my telegram?" he asked.

"No telegram has been received here, I assure you."

While they were discussing the matter the door bell was rung violently. A panting telegraph boy stood on the step with the message which had been sent the day previous. When questioned the boy said that the dispatch had just been received at the Brooklyn office, and was marked "rush."

The distance from the point in this city from which the dispatch was sent to its destination in Brooklyn is exactly three miles. As it took the electricity twenty-nine hours to travel this distance, the gentleman who sent the dispatch is anxious to know just how long it would take the same electricity to get to Europe, and whether it would ever get there if it were not marked "rush." Pending a satisfactory solution of this question, he intends hereafter to carry his own dispatches to Brooklyn.—*N. Y. Morning Journal*, Sept. 21.

The Overland Telephone and Telegraph Co.

Within the last three months, says the Philadelphia *Times* of the 19th, a formidable rival of the Western Union Telegraph Company and the Bell Telephone Company has been organized, patents purchased and work pushed so rapidly that in a few weeks it will be ready to throw its lines open to the public. The patents for improvements in telephone transmitters and telephone receivers were issued May 8, 1883, to Dr. Baxter, of Washington, and they are believed to be entirely new devices. The Overland Telephone and Telegraph Company was organized in New York on June 27, 1883, and, purchasing the patents referred to, at once began the establishment of offices in the principal cities and the erection of lines connecting them. Dr. Baxter was the first to invent a telephone constructed so as to convey speech by a "make-and-break" current, in a similar manner that sound is conveyed in telegraphy, thereby enabling conversation to be carried long distances. The new company will sell, not rent, its telephone. The Baxter telephone is said to work successfully in underground conduits.

Armington & Sims Engine Company.

The above company receives a great many orders for engines to be used in electrical service. Among recent orders are one 120-horse-power for the Edison Electric Light Company, and engines for the electric and illuminating companies in the following cities: Providence, R. I.; Pawtucket, R. I.; Old Orchard, Me.; Boston, Mass.; Lowell, Mass.; New Bedford, Mass.; Hartford, Conn.; Oak Bluffs, Mass.; Woonsocket, R. I; New Britain, Conn.; Sunbury, Pa.; Shamokin, Pa.; Brocton, Mass., and Lawrence, Mass. This list, while it indicates great activity on the part of the company, is not a little suggestive as to the widening application of the electric light.

THE TELEGRAPH.

THE W. U. CO. IN TEXAS.—The Western Union Telegraph Company is building lines connecting surrounding towns with Dallas. This is to head off the telephone company, which is growing to be a troublesome rival.

A BLOCK OF WESTERN UNION STOCK FOR LONDON.—The strength shown in Western Union stock at the close of last week was due to the statement that Cyrus W. Field, Jr., had sailed for England to conclude negotiations for placing a block of the stock in London.

THAT LAST QUARTERLY STATEMENT.—Press comments on the last quarterly statement of the Western Union Company differ naturally on various points, but the general sentiment with regard to the loss of $600,000 by the strike is that the loss is a heavy one and not to be borne often.

TELEGRAPHS IN THE FAR EAST.—It is said that in the treaty between France and Annam, lately signed, the government of the latter country guarantees the maintenance of a land line to be put up by the French between Hanoi, Tonquin and Saigon, in Cochin China. The undertaking is not a small one, as the line will run through 1,000 miles of wild, unknown country.

ANOTHER TELEGRAPH COMPANY.—The certificate of incorporation of the International & Northern Telegraph Company was filed in the County Clerk's office on the 19th. The new company proposes to connect all the principal cities of the United States and Canada. Its capital stock is $5,000,000, divided into 50,000 shares. Its corporators are mostly residents of Watertown, N. Y., with a few belonging to New York City.

THE CROSSES OF SCIENCE.—The waysides of Catholic countries in Europe are marked here and there by crucifixes, before which the plodding traveler bends his knee. Our American roads are also thickly dotted with crosses. As they rise against the sky at night they seem sacred symbols, but as the light of day strikes them they turn to telegraph poles, emblems of the hurrying life of the age.—*Boston Advertiser.*

REUNION OF VETERAN TELEGRAPHERS.—A reunion of the Society of the United States Military Telegraph Corps was begun at Chicago, Ill., on the 19th. The morning session was devoted to routine business. In the evening a banquet was held at the Grand Pacific Hotel in conjunction with the members of the Old-Time Telegraphers' Association. On Thursday forenoon another business meeting was held, at which action was taken looking to securing Congressional recognition of the services of the military telegraphers during the war.

SLUGGISHNESS OF GOVERNMENT TELEGRAPHS.—The introduction of the new six-penny telegram system in England is estimated to cost $2,500,000 for new wires and apparatus, and it is said that the resources of the department are so inadequate that the apparatus for the increased service cannot be ready before October, 1884. Fifteen thousand miles of new wire will be necessary. This specimen of official sluggishness is not likely, says our British contemporary the *Electrical Review*, to give any healthy stimulus to the movement in this country for the establishment of post-office telegraphs.

OPENING THE TELEGRAPH LINE TO BRAZIL.—The formal opening of the Central and South American Telegraph Company's lines to Brazil, connections being made via Galveston, Texas, took place yesterday, Sept. 21. The following was sent over the wires by President Arthur to the Emperor of Brazil:

"The President and Government of the United States salute the Emperor and people of Brazil through the new channel of direct communication between the two countries this day opened via Galveston and Valparaiso, and see in these multiplied links of intercourse the assurance that the happy relations between them will continue and increase to the material benefit of both peoples and countries."

The Chamber of Commerce also sent the following:

"The Chamber of Commerce of the State of New York congratulates the Commercial Association of the City of Rio de Janeiro on the completion of telegraphic communication between the Empire of Brazil and the United States, via Galveston, and cherishes the hope that the increased facilities to commercial intercourse will bind the two nations in closer ties of friendship."

THE TELEPHONE.

IN THE NORTHWEST.—St. Paul and St. Cloud, Minnesota, are to be connected by telephone.

NORTHAMPTON, MASS.—Another switch-board has been put into the Telephone Exchange office, and another operator added to the staff.

BELL TELEPHONE DIVIDEND.—The Bell Telephone Company has declared a dividend of $8 per share, payable Oct. 15. The transfer books will be closed from Oct. 1 to Oct. 10.

REPRODUCTION OVER SPIRAL WIRE.—In the article on spiral wire in the last issue it should have been stated that the longer (not the larger) the wire the quicker the reproduction.

THE TELEPHONE IN POLAND.—A correspondent in Lodz, Poland, writes us that the International Bell Telephone Company has just opened an exchange in that place, of which Mr. Charles O. Harris is in charge.

CONDUCTING POWER.—According to Dr. Van Der Ven's researches phosphor-bronze in telephone lines has about 30 per cent. of the conducting power of copper, silicon-bronze about 70 per cent., while the steel as used in wires has only about 10.5 per cent.

MR. A. ST. GEORGE'S INVENTION.—An invention has appeared in England by which the words spoken through a telephone are photographed and may be preserved *ad libitum*. If it comes into use it will greatly enlarge the domain of profane history.—*Lowell Courier.*

PLYMOUTH, N. H., TO WOODSTOCK.—An additional telephone wire is to be put up between Plymouth, N. H., and Woodstock, about 15 miles, caused by increased business. The line is to be extended to North Woodstock, six miles, the terminus of the Pemigewasset Valley Railroad.

TELEPHONE TO KENT ISLAND, MD.—A telephone line to Kent Island has been completed. Now Kent Island, in the Chesapeake bay, has communication with all parts of the State—by telephone to Centreville and by telegraph from that point. A line from Centreville to Church Hill will be pushed along as rapidly as possible.

A LONG PRIVATE WIRE.—Mr. John Burns, of Castle Wemyss, Scotland, has had provided for him by the post-office authorities telephonic communication between his office in Jamaica street, Glasgow, and his house at Wemyss Bay. The distance is thirty-two miles. The communication is effected by means of a metallic circuit.

GOOD TELEPHONIC GAIN.—The Erie Telegraph and Telephone company, notwithstanding the exceedingly warm weather, especially in the south, increased as follows, during August: Northwestern division 160, Southwestern division 135, Cleveland division 49—total, 344. Several new exchanges are in progress of construction in the southwest and northwest divisions.

MR. E. P. ALEXANDER, formerly of Morristown, N. J, but more recently of New Brunswick, has resigned his position with the New Jersey Telephone Company and accepted a more responsible one as superintendent of the Westchester Telephone Company's lines in Westchester County, New York. His headquarters will be at Yonkers. Mr. Alexander has done good service heretofore and promises to add considerably to his reputation in this enlarged field of usefulness.

DOES IT SPEAK MARATHI?—The telephone is being used extensively in India. The government of that country maintains a telephone in places too poor to maintain a telegraph office and too important not to have communication with other places. The telephone is a constant source of wonder and interest to the natives. One dignified Brahmin, to whom its mysteries were fully explained, remarked, "Yes, I think I understand; but does it speak Marathi?"

ANONYMOUS CRITICISM OF THE LOWELL COMPANIES.—A Lowell gentleman writes: "I noticed in your news columns of Monday a letter dated Lowell and signed Gardner Pierce, which reflects quite severely on the telephone companies. Being quite a large stockholder in the various companies, I made some inquiries regarding Mr. Pierce, but could find no such party in Lowell, and the telephone companies have no record of any such a stockholder on their books, and I feel confident I can mantain the assertion that the writer of the letter referred to is not a holder of any telephone stock, as his letter is a proof that he is trying to depreciate instead of advance the value of them."—*Boston Herald.*

PROFESSOR BELL APPEALS "CASE G."—Counsel for Alexander Graham Bell have filed with the Commissioner of Patents an appeal from the decision of the Examiner of Patent Interferences in "Case G" of the celebrated telephone controversy. By that decision, priority of invention of the telephonic receiver was awarded to J. W. McDonough. McDonough's claim, as allowed by the Examiners, was for "a telephonic receiver consisting of the combination in an electric circuit of a magnet and a diaphragm supported and arranged in close proximity thereto, whereby sounds thrown upon the line may be reproduced accurately as to the pitch and quality." The appeal just filed will carry the case before the Board of Examiners in Chief.

THE LEWISTON AND AUBURN CIRCUIT.—There are now 250 telephones in the Lewiston and Auburn Circuit. At the rate of about ten thousand dollars a year, our two cities are now paying for the telephone conveniences. The telephone is one of the greatest economizers of errand-boy and shoe-leather in general. Business got along without the telephone when it didn't know the telephone, just as it got on without the telegraph, the railway and the steamboat before these came in. But with every new invention facilitating exchange and traffic, there is more business, more satisfactory and comfortable business, and a better bringing of the world together. The probability is, our two cities get the value of their money, telephonically speaking.—*Lewiston Journal.*

A "STOUT" PROTEST.—At Red Bank, N. J., Thursday, 13th, workmen in the employ of the New York & New Jersey Telephone Company began putting up poles through the streets. John W. Stout ordered a party of men from his canning factory to fill up a hole dug in front of his property, and the telephone men were forced to desist and set the pole on the other side of the street. Several other citizens, in front of whose places of business poles have been erected, seeing Mr. Stout's determined stand, have taken fresh courage, and say that they will compel the company to remove the poles. The foreman of the workmen made a canvass of the town to ascertain what citizens would allow poles to be erected in their back yards. He found several so inclined, and the company proposes to have its pole line completed in this way.

A SUPPLEMENT TO THE TELEPHONE.—It is stated that a new electrical contrivance has been perfected by Mr. A. St. George, the inventor of the telephone which bears his name. This invention is really supplemental to the telephone, and will enable every description of conversation carried on through the instrument to be not only recorded but reproduced at any future time. Briefly stated, Mr. St. George's invention may be thus described: A circular plate of glass is coated with collodion and made sensitive as a photographic plate. This is placed in a dark box in which is a slit to admit a ray of light. In front of the glass is a telephone diaphragm, which, by its vibrations, opens and closes a small shutter through which a beam of light is constantly passing and imprinting a dark line on the glass. Vibrations of the shutter cause the dark line to vary in thickness according to the toness of the voice. The glass plate is revolved by clockwork, and

the conversation as it leaves the telephone is recorded on the sensitive plate, the imprinted words spoken being fixed as done in photography. The plate can be brought forward afterward, and when replaced in the machine and connected with a distant telephone will, when set in motion, give back the original conversation.

THE ELECTRIC LIGHT.

PARIS, FRANCE.—The Municipal Council of Paris have at last voted a credit for the electric lighting of the principal rooms of the Hotel de Ville.

NEWSPAPERS AND THE LIGHT.—The New York *Herald* uses 500 Edison lamps, *Sun* 98, *Commercial Advertiser* 86, *Mail and Express* 45, and *Truth* 13.

BRADFORD, ENGLAND.—An installation of 100 Swan lamps of twenty-candle power has just been completed at Blake's Restaurant, under the Exchange of Bradford.

A GOOD PROPOSITION.—The Philadelphia *Ledger* suggests that the parks and drives of that city be lighted by electricity furnished from the extra power of the waterworks.

BEHIND THE TIMES.—Boston has 304 electric lights, and yet lots of prominent citizens still continue to remove their hats to the old-fashioned lamp-posts at 3 A. M.—*Burlington Free Press.*

ALLEGHENY CITY, PA.—The charter of the Northside Light Company, a corporation for the purpose of manufactu ring and supplying light by means of electricity in Allegheny City, has been filed, with a capital of $10,000.

LITTLE ROCK, ARK.—A Brush Electric Light Co. has been organized in Little Rock, Ark. Their first plant consists of a 40 and a 16 light machine. The power is furnished by a 70 H. P. Westinghouse automatic engine.

THE NEW HAVEN GAS CO.—Without solicitation, the New Haven Gas Company has reduced its rates from $2.25 to $2 a thousand feet. Perhaps the electric light movement is more effective than any persuasion would have been.

DECATUR, ILL.—The Secretary of State of Illinois has given a license to organize to the Decatur Electric Light Company, whose capital stock is placed at $100,000. The corporators are Silas T. Trobridge, J. R. Mosser, and B. S. Heath.

MIDDLESEX ELECTRIC LIGHT COMPANY.—The Middlesex Electric Light Company is rapidly pushing its preparations for the street lights. The lamp posts are nearly all in position, and next week our streets will be illuminated with the modern light.—*Lowell Citizen.*

A PINTSCH EXHIBITION.—An exhibition of the Pintsch light was given on the evening of the 12th at the station of the New York & New England Railroad, Boston, where one of the West Shore passenger coaches, equipped with the light, was stationed for the inspection of interested persons.

A TERROR TO EVIL DOERS.—Mr. Toland, superintendent of lamps, Boston, Mass., has located electric lamps on Albany street, where a large amount of city property has been at the mercy of those who love darkness better than light; also in dangerous fire and police districts named by the commissioners of those departments.

"UNDER A CLOUD."—Great Britain does not come out well at the Vienna Electrical Exhibition. The English flag waves over little beyond the simplest telegraphic contrivances, and not many of them. But then the electric light is "under a cloud" in England, thanks to the company-mongers and company-muddlers.—*British Trade Journal.*

CHESTNUT STREET, PHILADELPHIA.—The electric lights on Chestnut street are all being moved to the southern pavement. It is claimed that the result is to light the street much more effectively. The car-drivers say that the change was effected by the influence of their company, and that the horses were really getting cross-eyed looking at the lights.

VERBEKE'S VERBOSITY.—A Frenchman named Verbeke, of the crank persuasion, has addressed several long and absurd letters to the Mayor of New York. He has an invention which consists of five pieces, each measuring in length 180 meters, and in connection with it he discusses electric lights, balloons, ether, spiritual and a variety of other motors.

LEWISTON, ME.—A private dispatch from Lewiston, Me., says that the fifty-light Thomson-Houston plant erected there at the State fair grounds during the past week started up on the evening of the 18th in fine style. Races will be trotted this evening and during the continuance of the fair by electric light. The novelty of the thing causes a great sensation in Lewiston.

ELECTRIC LIGHT AND VEGETATION.—Dr. P. P. Deherain maintains that the electric light contains rays which are hurtful to vegetation, but these, he says, can be held back by transparent glass. The light itself, he finds, contains enough of the rays useful to vegetation to maintain the life of plants for two months and a half; but the quantity of favorable rays is too small to bring crops to a condition of maturity.

LONDON RESTAURANTS.—The proprietors of the large popular restaurants of London find that it pays them to put in the electric light. The Adelaide Gallery has been wired for about 320 Edison lamps, and the Edison Company, having for some months lighted up part of the Holborn Restaurant with 800 lamps, are now making arrangements to lay down plant there for 1,000 additional sixteen-candle lamps.

ILLUMINATING A BRIDGE AT LOWELL.—Central bridge was illuminated by the electric light on the evening of the 18th, three lamps having been placed in position in the the centre at the spring of each arch. The effect was very pleasing and the broad and handsome structure assumed an almost fairy-like appearance. There were plenty of promenaders, people who enjoyed the novelty of walking on the smooth sidewalk under the electric light.

AN ELECTRIC LIGHT CARBON.—A carbon for electric lighting purposes is thus prepared by M. Jacquelain so as to remove all the impurities from it. Gas carbon is subjected (1) to treatment with dry chlorine at a red heat for 30 hours; (2) to treatment with hot alkali for about three hours; (3) to immersion in hydrofluoric acid (one to two of water) at a temperature of 15° to 25°; and (4) to the action of the vapor of a highly boiling hydro-carbon.

RENOVO, PA., AND THE EDISON.—P. B. Shaw, State manager of the Edison Electric Light System, has visited Renovo looking up a site for the erection of a central station house for the introduction of the electric light at an early day. Within the month, it is announced, a representative of the Edison company will be sent there for the purpose of soliciting subscriptions for stock. The company proposes to issue $20,000 worth of stock, in shares of $100 each.

HARRISBURG, PA.—The Pennsylvania Electric Light Company of Harrisburg are now lighting the city and public grounds. They use the Fuller system of lighting, and the power is furnished by a 100-horse-power Westinghouse engine. At a recent speed test made by the Fuller Company, the number of revolutions was found to be absolutely invariable. The test was made with a continuous recording speed indicator, and the resulting diagram was a straight line.

TRANSFER IN BOSTON.—The formal transfer of the Boston lighting plant, franchise and business from the American Electric and Illuminating Company to the Merchants Light and Power Company was made on the 14th at the office of the companies, and the new company take possession, and henceforth manage the lighting business in that city. The American Electric and Illuminating Company will, as before stated by us, henceforth be purely a construction company.

EDISON VS. SAWYER & MANN.—A note from Washington says that ex-Senator Conkling has been in that city as counsel for Edison in the patent case of Edison *vs.* Sawyer & Mann, application for patent upon electric light appliances. The question involved is the priority of discovery of carbonized strips of paper to be used in incandescent electric lights. Several months ago the examiner of interferences decided against Edison, but the Board of Appeals reversed his decision and gave priority to Edison. Against this decision Sawyer & Mann have appealed to the Commissioner, who is now hearing the case.

EDISON LIGHT IN NEW ENGLAND MILLS.—Mr. George C. Bancroft, New England agent of the Edison Electric Light Company, has contracted with the Merrick Thread Company to light their new mill at South Holyoke by electricity. A plant with a capacity of 500 lights will be put in, though but 300 will be used at first, and the work of putting up the wires will soon begin. This is the third contract awarded to the Edison Company by the Merrick Company, which shows that they have full faith in the incandescent lights. Mr. Bancroft is also introducing the system at the Gilbert manufacturing company's mills at Gilbertville.

ELECTRIC LIGHTS IN THE FT. WAYNE YARDS.—The New York Electric Light Company, of New York, has made a contract with the Pennsylvania Company, operating the Pittsburgh, Ft. Wayne & Chicago Railroad, which may result in the lighting of all their freight yards with the electric light. The contract calls for a trial in the Allegheny yards, at the Outer Depot. The railroad company is to furnish the power and the electric light company the remainder of the plant. The trial is to last for sixty days, and if it is successful it will be retained and used, not only in the Allegheny yards but also at other points. The plant is to be erected as soon as practicable.

AUTOMATIC CUT-OFF ENGINE.—The Brush Electric Light and Power Company, of Cleveland, Ohio, have just made a practical test of the automatic cut-off engine built by the Ball Engine Co., of Erie, Pa., which, it will be remembered, is the embodiment of an entirely new theory of regulation, the governor being arranged to weigh the work being done. This engine was sold under a rather unusual guarantee, the builders making the sale conditional upon the engine's ability to maintain absolutely the same speed under full load as when entirely empty. The *American Manufacturer* understands that, after a careful test, the first-named company not only acknowledge the entire fulfillment of the guarantee in this respect, but express themselves highly pleased with the performance of the engine in every respect.

THE NATIONAL CAPITOL.—Representatives of the Edison and United States Electric Light companies made arguments before Secretary Folger at Washington on the 11th —referred to in last issue—in favor of using that method of illumination in public buildings. They said the government could thereby save fifty per cent. over gas. They propose to light the Treasury building as a test of the advantage of electric light, both in point of satisfactory illumination and cheapness. Secretary Folger said he would consider the matter. He thought the government was now paying too much for lighting the public buildings. He pointed out that the lighting of federal buildings in New York last year cost seventy-five thousand dollars. He seemed inclined to let the electric light people have a chance of showing what they can do.

THE BRITISH MUSEUM.—The reading-room has been lighted by the electric light until eight o'clock in the evening, in order to afford students an opportunity of making progress with their work. The method of lighting is the same as that adopted in previous years, but all the lamps have been readjusted with a view to obtain greater efficiency. Four arc lights, suspended from the dome, illumine the reading-room; one lights the corridor; two are in use in the hall; and four, instead of two as formerly light the courtyard of the building. Swan lights are distributed through the lavatories, etc. Last year the minimum light given in the reading-room was of about 12,000 candle-power; this year it is 14,000, and it is capable of extension to 16,000—4,000 for each of the large arc lights. The works have been carried out by Messrs. Siemens, under the superintendence of Mr. J. Barrett. The lighting of the reading-room will be continued until the end of April next.

MISCELLANEOUS NOTES.

IRISH ELECTRIC RAILWAY.—On the 14th inst. was opened the Irish electric railway, to run from the railway terminus at Portrush to the Giant's Causeway.

SCHOOLS OF ELECTRICITY.—The lay press has been discussing the question of schools of electricity, conducted by the Government, by the universities and colleges, and by private individuals.

ANOTHER ELECTRIC ROAD IN IRELAND.—The first sod has been cut of the proposed electric tramway from Newry to Bessbrook. The work is to be carried out by the Bessbrook Spinning Company.

THE ELECTRICAL CONFERENCE POSTPONED.—It is announced that the conference on the subject of electrical units has been postponed to April 2, 1884. The conference in regard to submarine cables will meet at Paris on October 15.

CABLES IN NORTHERN EUROPE.—The Swedish and Danish governments have decided to lay down a new submarine cable between their respective countries. The cable, which will consist of four wires, will be laid from Helsingborg to Elsinore and by the island of Hveen.

COLLODION IN STRIPS.—M. J. Seure states that collodion in thin strips or sheets is negative toward all other bodies. In interpreting the therapeutical effects of collodion, account, he believes, should be taken of its electric powers. Gutta percha, when it is electrified, presents modifications which are analogous to those of collodion.

AT LEAST ONE DOLLAR.—The most touching episode in Mr. Jay Gould's autobiography, as given by himself before the Senate Committee, was the narration of how once, in the sweetly innocent days of his youth, while the angels still choired to the young-eyed cherubim and all heaven thrilled with expectant joy, he actually earned a dollar.—*Life.*

SOFT IRON, STEEL, NICKEL AND THE MAGNET.—Prof. Hughes finds that the critical state of soft iron, when it ceases to be attracted by a magnet, is reached just as the iron is heated to a yellow white, or between white and red heat. Steel also loses its power of being magnetized when heated, and on being cooled 100° below zero loses it again. Nickel similarly parts with its magnetic property at the very low temperature of boiling water.

DUTY ON INSULATED COPPER WIRE CABLES.—Secretary Folger has decided against the Brush Electric Light Company in the matter of the duty on insulated copper wire cables. Copper wire is enumerated at two rates in the new tariff law, one 35 per cent. ad valorem and the other 45 per cent. The company wanted to pay the lower duty, but the secretary decided that, under the law governing articles twice enumerated, they must pay the higher rate.

THE N. Y. ELECTRICAL SOCIETY.—The meetings of the New York Electrical Society will be resumed on Friday evening, October 5th. The lecturer of the evening has not yet been definitely decided upon, but it will probably be either Professor Chandler of Columbia College, or Mr. George d'Infreville, of the Western Union electricians' department. If the latter, the subject will be the quadruplex, to which Mr. d'Infreville has devoted much time and study.

PHOTOGRAPHS OF LIGHTNING.—Dr. Haensel, a savant of Reichberg, Germany, has succeeded, after many experiments, in photographing several flashes of lightning. The photographs took in part of the landscape and made it possible to estimate the locality where the lightning struck. It is also possible by this process to compute the length of the course traversed by the electric current. These experiments are to be continued with the aid of stereoscopy.

THE AMERICAN ELECTRICAL EXHIBITION.—A circular has been issued by the Franklin Institute directing attention to the International Electrical Exhibition which is to be held in Philadelphia in September, 1884, under the auspices of the Institute. Congress has given it an official recognition, and granted permission for the importation of articles for exhibition free of duty, and it is expected that some interesting electrical apparatus will be sent from a broad as well as from different parts of the United States.

SUCH IS FAME.—My son, you may invent a new electric light, you may improve the telephone until it can be talked to, you may even revise the tariff to satisfy both parties, you may write a dozen successful books, you may save a sinking State, you may make your name famous, your house great and your memory blessed, and then you will not have as big a funeral as Tom Thumb, who never did anything in his life except to grow less in fifty years than most boys do in ten. And he only did that because he couldn't help it.—*Burlington Hawkeye.*

AN UNDERGROUND TRANSACTION.—The Morse underground conduit system was tested on the night of the 15th, at 2,042 Market street, Philadelphia, says the local *Times*, apparently with complete success. Five of the conduit pipes were in operation in an uncovered trench, and through them were carried from a dynamo machine 4,000 feet of wire, which ran two lights, a telegraph "ticker" and a telephone loaned by the Bell Company. The overjoyed directors murmured inarticulate witticisms to one another through the pipes about beer and politics, and the projector rehearsed with great gusto the history of his struggle and success.

A NEW GALVANOMETER.—"A new galvanometer," says *Nature*, "has been brought out by M. Ducretet. It contains the valuable properties of being dead beat, and being used for both strong and high potential currents. Its chief points consist in a movable compound coil, the fine wire coil being nearly 6,000 ohms, and the framework of this coil, which is a copper ring, being the low resistance coil. The magnetometer part consists of a box with a very delicately balanced needle immersed in some transparent liquid. The needle is very small, and has attached to it a fine aluminum pointer by which the readings are made. The galvanometer can be used for all strengths of current in practical use."

CARBON FOR ELECTRIC PURPOSES.—M. Jacquelain has endeavored to prepare a pure carbon for electric purposes that should be as hard and as conductive as gas carbon. He first takes gas carbon, which he submits to four processes:—(1) Treatment with dry chlorine at a red heat for thirty hours. (2) Treatment with hot alkali for about three hours. (3) Immersion in hydrofluoric acid (1 to 2 of water) at a temperature of 15° to 25°. (4) Carbonized by heating strongly in the vapor of a high-boiling hydrocarbon, for commercial purposes gas tar will do well. All these operations may be performed after the carbon has been cut into sticks. By these processes the impurities have been reduced to a minimum, and a good, pure carbon obtained.

ELECTRICITY VS. COMPRESSED AIR.—M. P. Delahaye has instituted a comparison of the relative merits of compressed air and electricity as a motive force for machines in mines. For long distances he says the latter has the advantage, and the plant required and the expense of maintenance are less than in the case of compressed air. In the coal mines of Zankerode and Oppel, in Saxony, electricity has for some time been employed to work a ventilating fan and draw trains of coal. The fan is distant from the machine which generates the electricity about 2,500 feet, and there is an available force of 49 per cent. To work the electric locomotive 37 per cent. is found to be utilized, although the generator of the electricity, in this instance, is 2,000 feet away.

ELECTRIC CABS AND CABMEN.—Mr. Edison, says the *Morning Journal*, should give us an electric cab. That would be a great advance, but when it comes it will be incomplete unless he can give us an electric cabman. The cheap horse cab will bring thousands of New Yorkers who only see the Jehu on his stand or at a funeral, into close relation with that obliging person. His hearty, brusque contempt for fine feelings, his idea of the shortness of a mile, will be better, perhaps more unfavorably known. Would that cheap cabs did not bring the cheap cabman. A purely electric person on the box whose miles were electrically measured for him, whose supply of change on dark nights never failed, who carried an electric light to prevent collisions with other cabs, a cabman who never got drunk and always took the shortest route, him we long for. It is the chance of Mr. Edison's life.

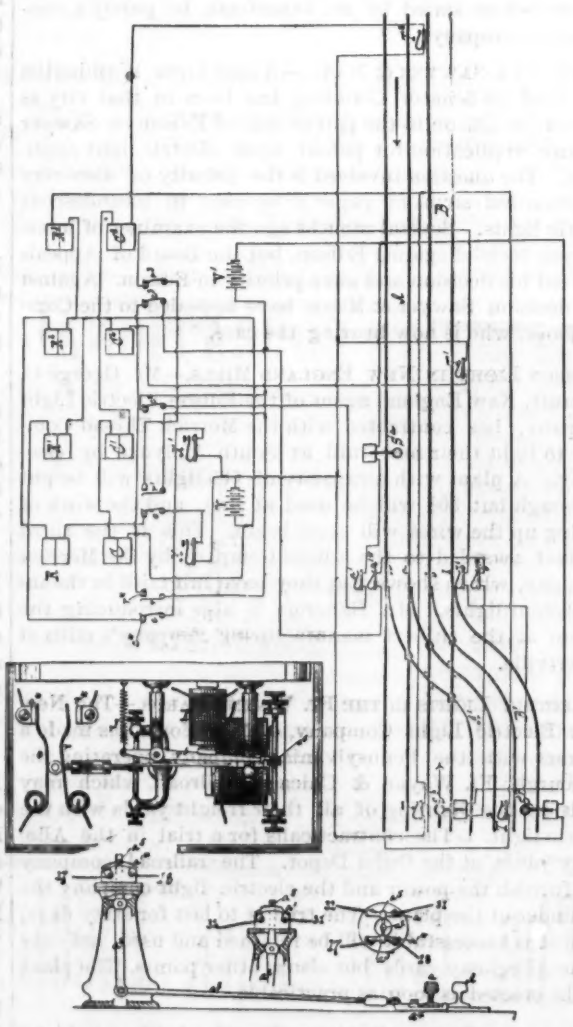
STOCK QUOTATIONS.—Telegraph, telephone and electric light stocks were quoted on Thursday of last week and Thursday of this week as follows:

	Sept. 13.	Sept. 20.
American Cable	64¾	64
Western Union Telegraph	82⅛	80⅞
Bankers' and Merchants' Tel.	131¼	131¾
Mutual Union Telegraph	17¾	16½
American District Telegraph	25	....
Bay State Telephone	....	95
Bell Telephone	230	228
Mexican Telephone Co.	2⅝	2¼
National Bell Telephone of Maine	75	70
Suburban Telephone Co.	107½	100
New York and Pennsylvania	91	90
Boston & Northern Telephone	117½	114
Erie Telephone	59	55
People's Telephone	8½	8¼
People's Telephone (New England)	....	5
New York and New Jersey	95	94½
Brush Electric Light	....	95
Edison Electric Illuminating	....	45
U. S. Electric Lighting	....	120
Electric Railway of United States	....	75
Underground Electric Cable	....	185
American Bell Telephone	....	227
N. Y. and New Jersey Telephone	....	96
Globe Telephone	....	28

ELECTRICAL PATENTS ISSUED

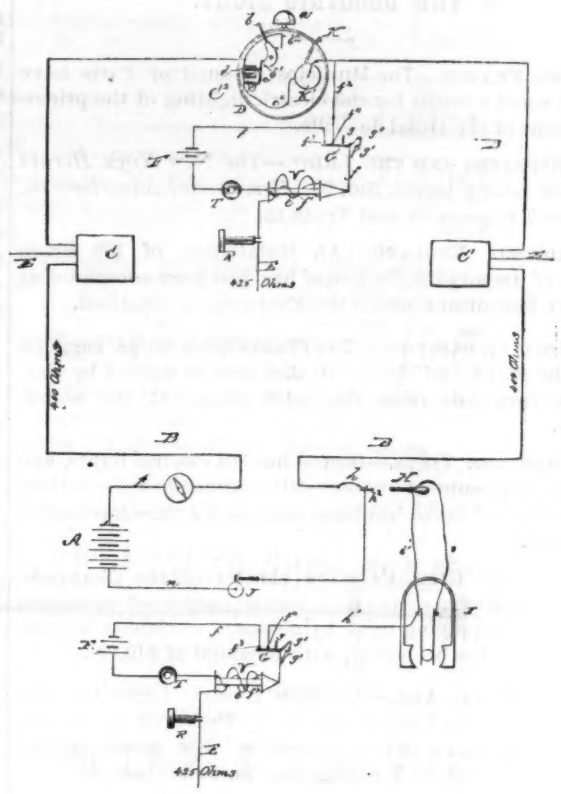
And Dated Sep. 11, 1883.

Apparatus for Constructing Electric Conductors; J. Burrows Hyde, New York, N. Y. 284,855
Apparatus for Lighting Gas by Electricity; Henry J. Warren and Henry F. Packard, assignors to Henry F. Chase, Boston, Mass. 284,784
Battery Screen; Andrew S. Hallidie, San Francisco, Cal. 284,735
Double Circuit Instrument; Alvah W. Hall, Meriden, Conn. 284,840
Electrical Conductor; Frank Moore, Philadelphia, Pa. 284,970
Electric Wire; William Halkyard, Providence, R. I., assignor of one-half to Henry A. Church, same place. 284,959
Electrical Annunciator; David A. McCormick, Detroit, Mich., assignor of one-half to Lewis Mann, same place. 284,878
Electrical Switch and Signal Apparatus: Alvah W. Hall, Meriden, Conn. 284,841
Apparatus for Interlocking Electric Signals, Alvah W. Hall, Meriden, Conn. 284,842



Brief.—Armature of *R* locks armature of *C*, releasing it when *R* is energized. Circuits normally open and signals down ("danger"). Operator controls signal S_b by use of key *K*, and signal S_b' by use of key *K'*. S^a is controlled by switch circuit-controller *a'* and spring a^2. When down it indicates "danger" for *A'*, "safety" for *A*. The circuit of each signal-magnet includes elements *a' a'* b'*, etc. (circuit-controllers connected with switch levers) *c c' r r'*, etc. (circuit controllers connected with magnets), such that it cannot be completed simultaneously with the circuit of any other signal which would permit entrance of conflicting trains. Track circuit-closers *T T*ᵇ, "danger." S_b S_b', after passing trains. *T'* controls key c^2. T^2 returns apparatus to normal position.

Telephonic and telegraphic system; John P. Barrett, Chicago, Ill. 284,595



Claim.—1. In a telephonic or telegraphic system, the combination, with a normally-closed main line and main battery included therein and a branch to ground, of a resistance device included in said branch and having a resistance not less than that of the main line, substantially as described, and for the purpose set forth.

2. In a telephonic or telegraphic system, the combination, with a normally-charged main line, a branch to ground arranged to be connected with said main line, and a transmitter-battery circuit including the primary of an induction-coil, of the secondary of said induction-coil included in said branch, and having in connection with the branch a resistance not less than that of the main line, substantially as described.

3. In a telephonic or telegraphic system, the combination, with a normally-closed main line including one or more electric signaling-receiving devices, and a main battery included in said main line and having less electro-motive force than is required to operate said signaling device or devices, of an auxiliary magneto-electric generator arranged to be included in said main line for re-enforcing the battery-circuit, substantially as and for the purpose set forth.

4. In a telephonic or telegraphic system, the combination, with a normally-closed main line including electric signal receiving and transmitting devices at one or more outlying stations and an electric signal receiver at a main or central station, of a main battery included in said main line and having sufficient electro-motive force to control the signal-receiver at the central station, but less than that required to operate the signal-receiving devices of outlying stations, and an auxiliary electric generator arranged to be included in the main line at will for re-enforcing the normal current thereon, substantially as described, and for the purpose set forth.

5. In a telephonic or telegraphic system, the combination, with a complete metallic main-line circuit and two or more branches connected to ground and including transmitting and receiving devices, of switches for connecting said branches to or disconnecting them from said main line, whereby any two branches may be connected through the main line, and when so connected the transmitter-currents from either branch will be provided with two short routes to the receiver of the other branch as set forth.

6. The combination, with the main line and ground branch arranged to be connected therewith, of the magneto-generator arranged to be connected in said main line and having said ground branch connected with one of its brushes, whereby when the said generator is connected to the line the ground branch is at the same time automatically connected to the main line, substantially as described.

Electric Switch or Circuit Controller; Alex. Bernstein, Boston, Mass. 284,715
Electrically Operating Railway Gates or Signals; Theodore A. B. Putnam, New York, N. Y. 284,670
Electric battery; Hugh A. Burns, Ansonia, Conn. 284,605
Safety device for electric wires; Alex. Bernstein, Boston, Mass. 284,714
System of laying telegraph wires; Andrew I. O'Reilly, St. Louis, Mo. 284,655
Telephone switch; Charles E. Scribner, Chicago, Ill., assignor to the Western Telegraph Company, same place 284,909
Telephone switch; Charles E. Scribner, Chicago, Ill., assignor to the Western Telegraph Company, same place 284,908
Telephonic system; John P. Barrett, Chicago, Ill. 284,594
Underground electric conductor; J. Burrows Hyde, New York, N. Y. 284,854
Underground tube for telegraph wires; Wilhelm Londeroth, New York, N. Y. 284,643

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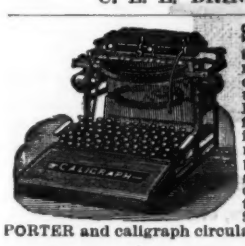

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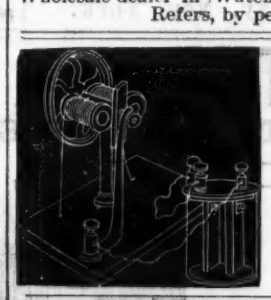

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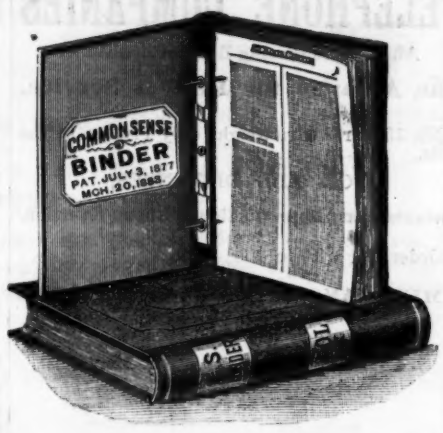

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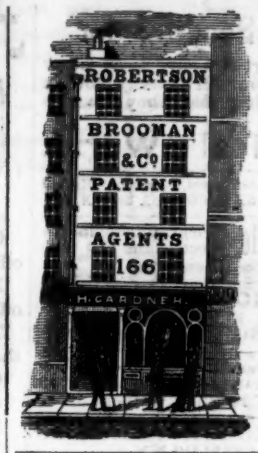

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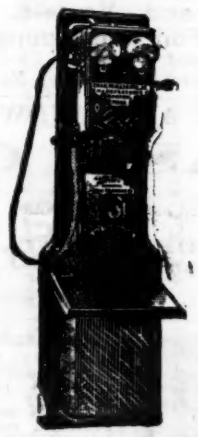

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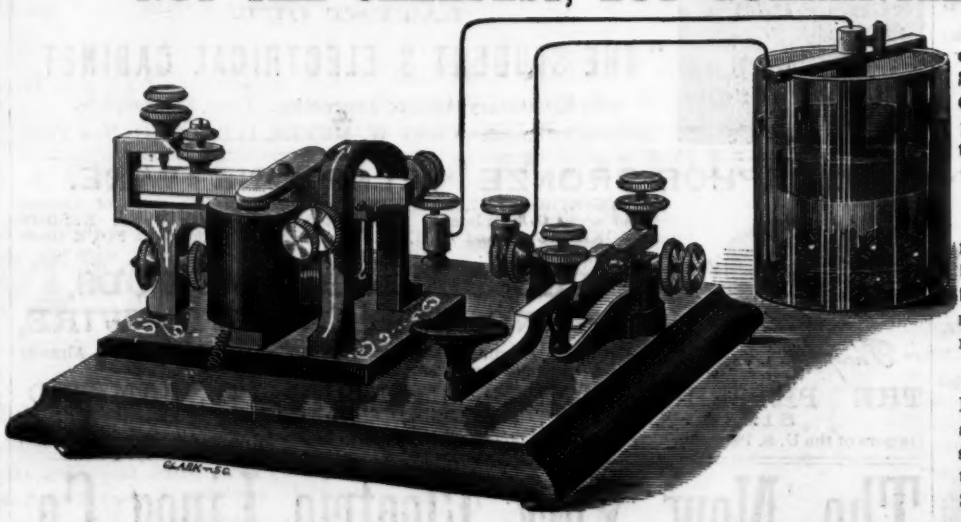

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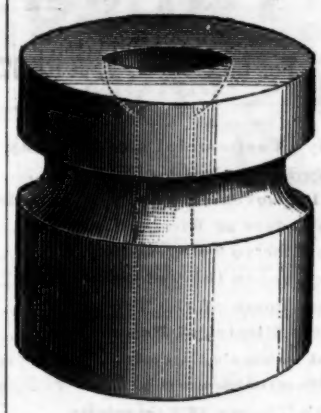

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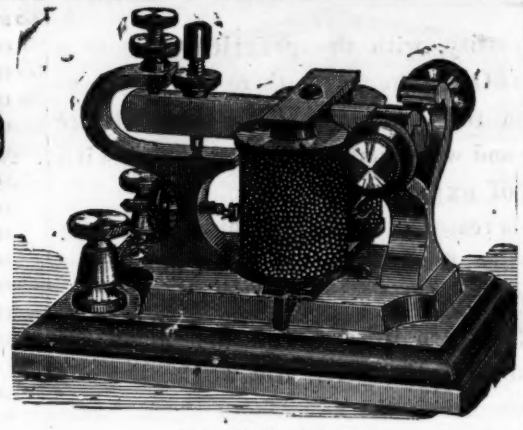

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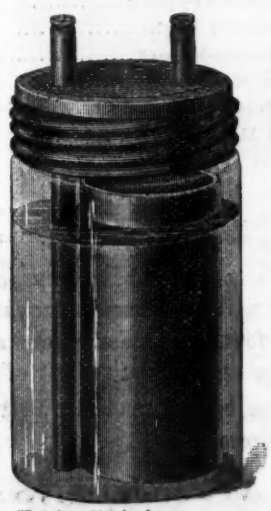

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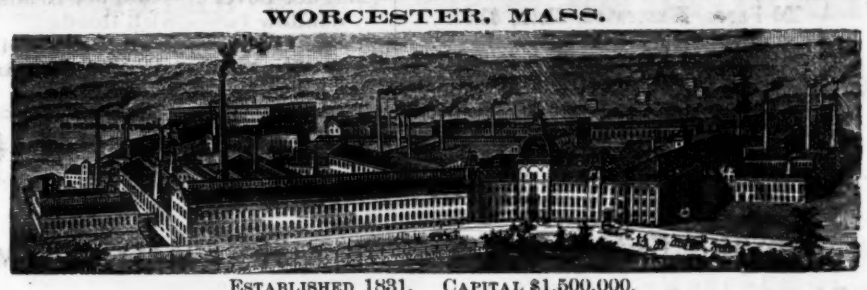

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and anticipating at an early day the great demand that would exist for that article, they have adopted and fully proved certain methods and appliances for the production of Telegraph as well as of Telephone Wire which are peculiar to themselves. Among them may be mentioned the

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N. B.—The qualities known as extra Best (E. B. B.) and Best Best (B. B.) kept constantly in stock

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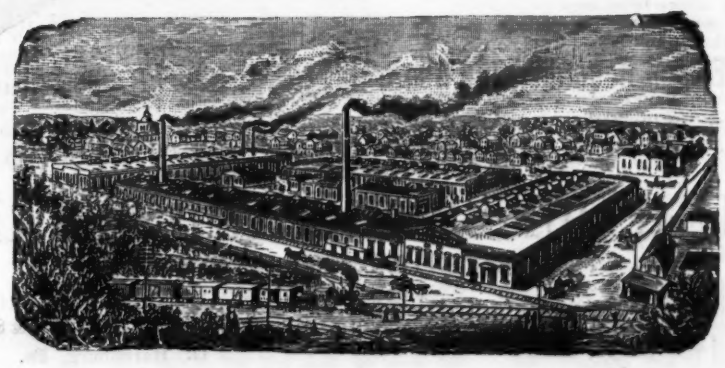

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Prices of our machines and lamps the same as our regular list. Our agents will give estimates We shall commence this month the shipment of

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By this Company, just as all the apparatus hitherto sold by us has been; and that the statements of our opponents regarding them, which have been so industriously circulated of late, are false in every particular.

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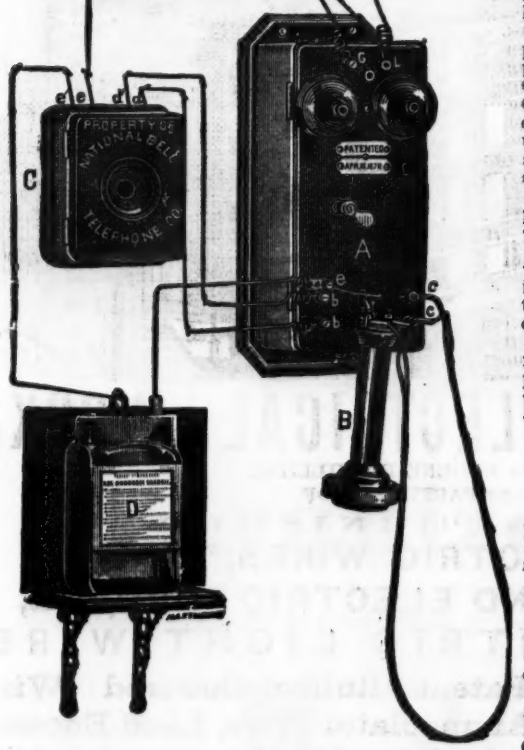

This Company, owning the Original Patents of Alexander Graham Bell for the Electric Speaking Telephone, and other patents covering improvements upon the same, and controlling, except for certain limited territory, under an arrangement with the Western Union Telegraph Company, the Gold and Stock Telegraph Company, the American Speaking Telephone Company, and the Harmonic Telegraph Company, the patents owned by those companies, is now prepared to furnish, upon application, either directly or through any of its agents, Telephones of different styles, and applicable to a variety of uses.

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in all unoccupied territory, similar to those now in operation in all the principal cities in this country.

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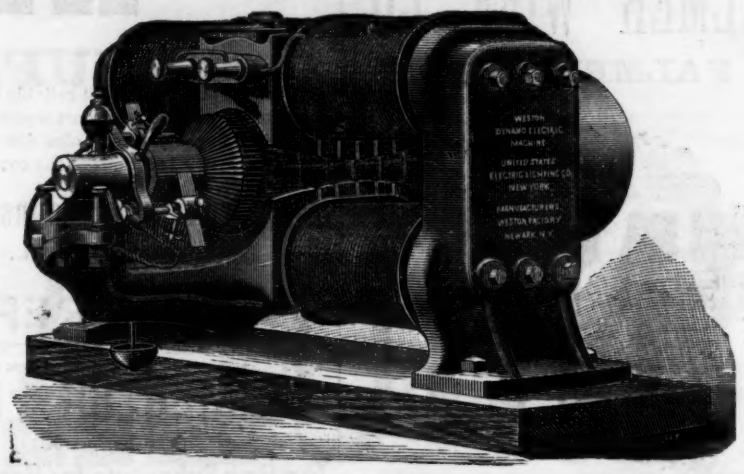

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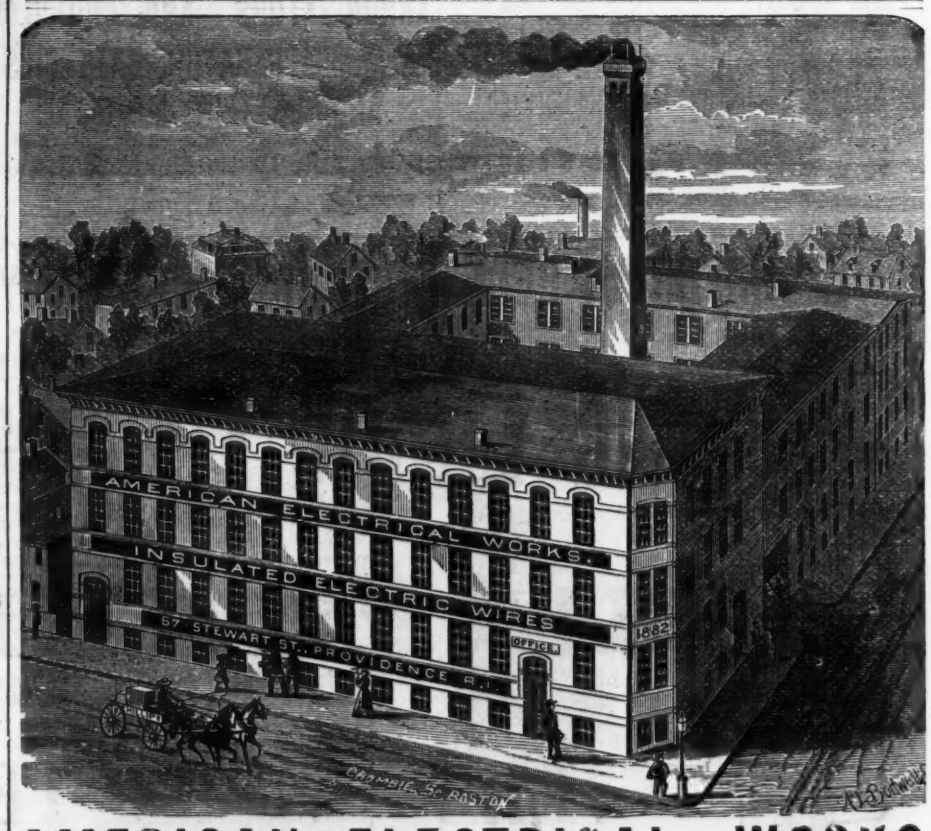

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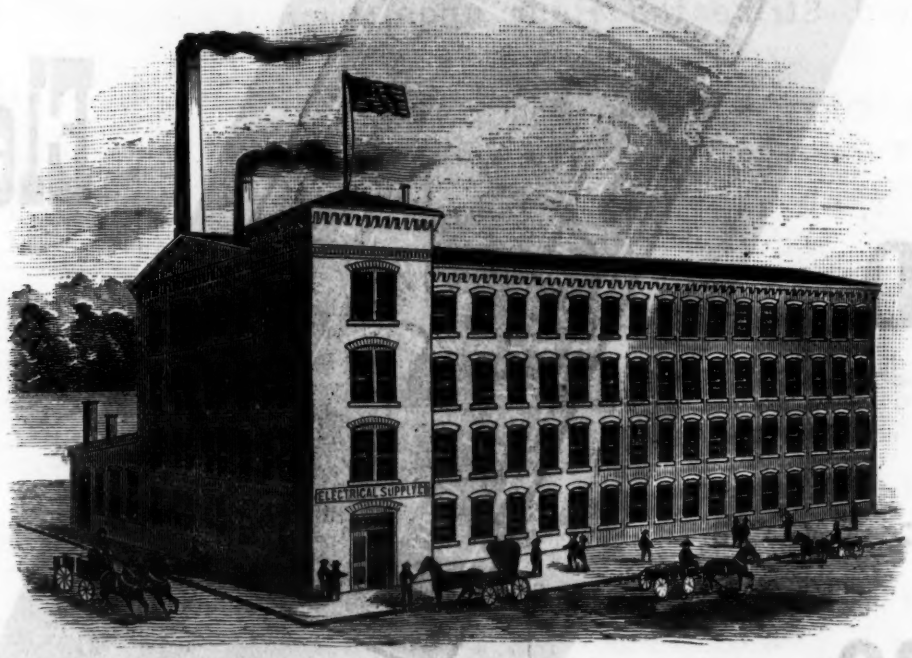

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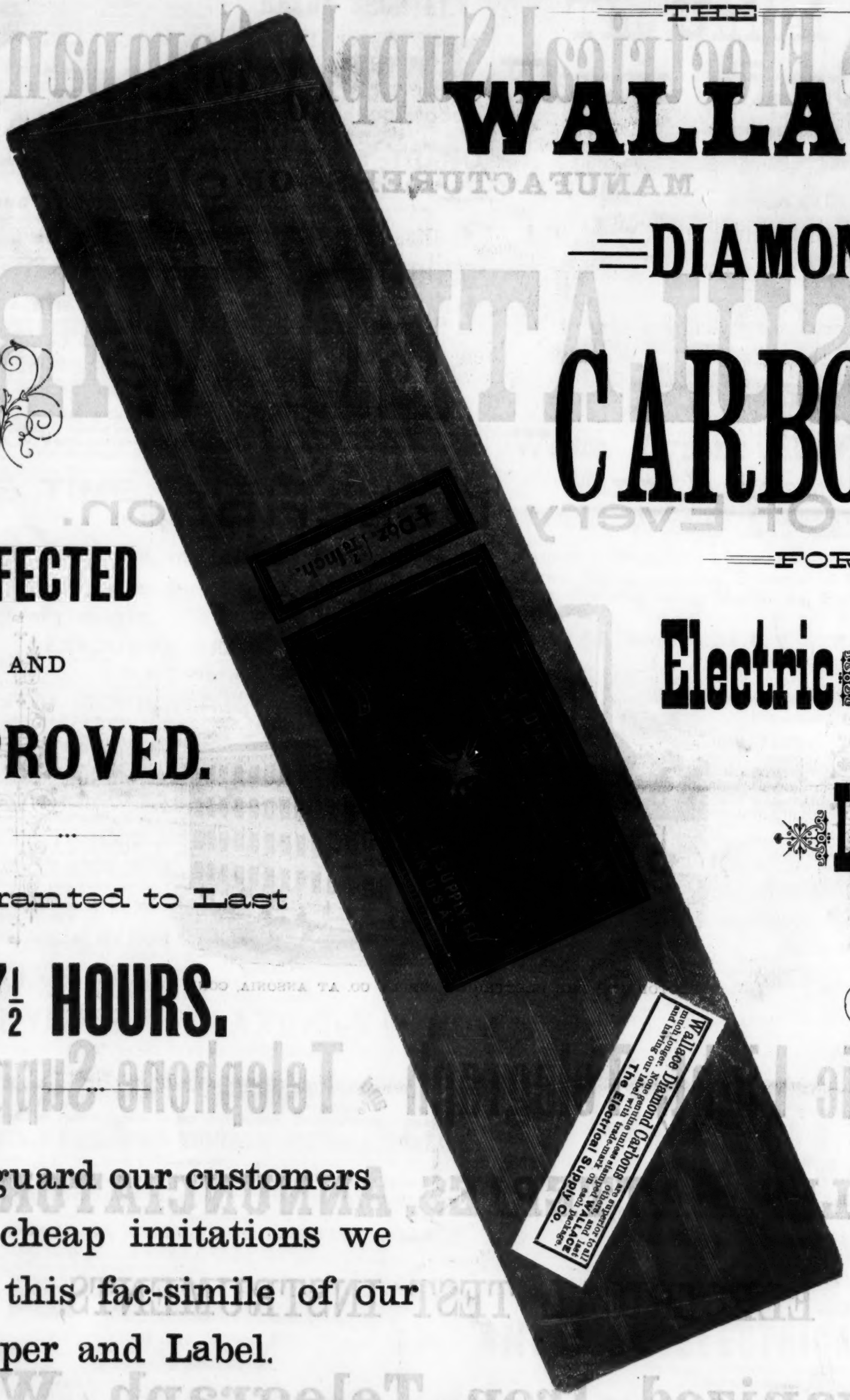

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